2nd International Conference on

Managing Urban Land

Towards More Effective And Sustainable Brownfield Revitalisation Policies

A Publication of the Research Program “Research for the Reduction of Land Consumption and for Sustainable Land Management” (REFINA) of the Federal Ministry of Education and Research (BMBF)

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Contracted by

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Foreword

REVIT & CABERNET 2007

Land is an essential resource for any successful society. Brownfields comprise land once used and now discarded. Urban areas provide most jobs, are actively supported by businesses and higher education institutions and are key to achieving social cohesion. Profligate land consumption we now know is neither sustainable nor acceptable to those of us concerned for the rights of future generations or the quality of life of our peers. Ensuring economic prosperity, supporting social inclusion and protecting the environment are EU policies established by the Lisbon and Gothenburg Agenda. Sustainable urban brownfield regeneration is key in achieving essential complementarity in reaching these sometimes conflicting goals.

Brownfield regeneration is often complex, can take years and requires input from many professionals and stakeholders. Site history may be asset or liability. Contamination may restrict site reuse options or, perhaps rose-tinted, memories of long gone jobs and former economic stability haunt local perceptions. Relics may recall achievements to be preserved and celebrated. Nevertheless human dignity and biodiversity deserve absolute priority in determining regeneration options. Belfast's Laganside Development Corporation, in co-hosting the 1st International Conference on Managing Urban Land, demonstrated international best practice in regeneration fostering unity and peace – true social cohesion!

REVIT & CABERNET 2007, the 2nd International Conference on Managing Urban Land, has brought together a wide range of professionals from across Europe and beyond to share knowledge and best practice experience of the interacting social, environmental, economic and governance issues related to the revitalisation of brownfield sites. The conference contributes to what Europe does best – co-operation, networking and mutual learning between regions, cities and people.

REFINA is a German Federal Ministry of Education and Research initiative in "research for the reduction of land consumption and for promoting sustainable land management" that funds projects providing a scientific basis for political decisions and measures. REFINA, sponsors of this book, is part of Germany's national Sustainability Strategy to reduce land consumption for settlement and transport to 30 hectares per day by 2020.

The INTERREG IIIB REVIT project, has developed integrated approaches to the development, management and promotion of brownfield sites. REVIT shows that applying principles of sustainable development to brownfield renewal includes legal and institutional frameworks to achieve EU and local environmental, economic and social well being targets.

'CABERNETers' are a friendly generous group who realised, some to their surprise, that the giver of information and experiences often benefits as much if not more than the recipient. So we hope you will appreciate the wealth of information in this book as you apply it to your own circumstances and that you will come to the 3rd Conference in 2009 to tell of your own successes and lessons learnt – that we and others may learn and celebrate with you.

Detlef Grimski, Thomas Zügel, Uwe Ferber, Thomas Ertel, Kate Millar, Gritta Geffers, Paul Nathanail, Gerard Jilleba,

STUTTGART, APRIL 2007

A warm welcome to the 2nd international conference on managing urban land

Dr. Annette Schavan
Federal Minister for
Education and Research

The rapid development of towns and cities is leading to urban sprawl in Germany. While there are currently more than 2,000 square kilometres of urban brownfield sites, a total area of about 310 square kilometres is newly developed for transport and housing every year – this is roughly equivalent to the size of Munich. It is therefore an important public task to ensure that brownfield sites are made available for housing, industry and transport. Only in this way can we protect our landscape and preserve our natural and cultural heritage and thus maintain, improve and shape our quality of life and development potentials.

In order to recycle brownfield sites, a number of different aims such as protection of the environment and nature conservation, economic growth as well as the provision of socially compatible housing, quality of urban building and mobility must be brought into harmony. Particular attention must be paid to the successful remediation of the contaminated sites of old smelting plants, gas works, chemical plants and explosives manufacturing plants. It is our aim to reduce the present use of greenfileds for housing and transport to one third (30 hectares per day) by the year 2020.

The funding priority „Research for the Reduction of Land Use and for Sustainable Land Use Management (REFINA)" of the Federal Ministry of Education and Research is part of the Federal Government's national sustainability strategy. With this programme we will support projects for efficient land use which develop and implement, in particular, utilisation concepts for brownfield sites in city centres with a total of about 20 million Euro.

The programme is funding projects which develop and implement exemplary innovative approaches for the redevelopment of brownfields in the future.

Innovations are, however, generated mostly at the interfaces of different disciplines. Co-operation between different disciplines is therefore of outstanding importance for changing course in the use of natural resources.

The challenges in front of us cannot be mastered at national level alone. The 7th Research Framework Programme offers an excellent platform for European co-operation.

The aim of the 2nd International Conference on Managing Urban Land is to bring together a wide spectrum of experts and disciplines in the field of the management of urban land. The emphasis will be on exchanges of experience about proven methods, innovative solutions and applications of new technologies and tools. First results of projects funded under REFINA will also be presented. I wish all those taking part in the conference every success and many new ideas for your further work.

Dr. Annette Schavan, MP

Federal Minister for Education and Research

Dr. Wolfgang Schuster
Mayor of Stuttgart

Welcome to the city of Stuttgart, Capital of the state of Baden-Württemberg. The issues that will be addressed at the 2nd International Conference on Managing Urban Land are of great importance to all local and regional authorities both in Europe and in the rest of the world. How can we succeed in promoting employment and growth without consuming additional resources? How can we use urban brownfields in order to revitalizes and modernizes our cities? I am delighted that Stuttgart has the privilege to serve as venue for this major conference.

We see ourselves as an international city and are therefore very much interested in an exchange on the European and international levels. In Stuttgart people from over 170 nations live together in peaceful coexistence. Over 100 languages are spoken here. Over the years, we have built up numerous networks on subjects ranging from mobility, to social integration policies, development aid, child friendliness or the challenges posed by demographic change. It is our firm belief that the best solutions arise from an exchange of best-practice examples. Over and above this, transnational co-operation has the advantage that it fosters closer links between and mutual understanding for one another thus helping promote peace through-out the world.

I want to invite all delegates, conference schedule permitting, to take time out to discover our city. Stuttgart is the "European Capital of Sport 2007" and the host city for four world championships as well as venue for the World Athletics Final. In the autumn, just a stone's throw away from Stuttgart International Airport, Stuttgart's New Trade Fair Center will open its doors to the public. It is designed as a showcase for the export-oriented companies of Baden-Württemberg. Explore our city, its theatres and museums, its parks and recreational opportunities!

I wish you a rewarding stay in Stuttgart!

Best wishes
Dr. Wolfgang Schuster, Mayor of Stuttgart

Prof. Dr. Danuta Hübner
EU Commissioner for
Regional Policy

The aim of the REVIT project – development of new concepts for sustainable regeneration of brownfield sites – represents one of the major challenges for European cohesion policy: creating the conditions for sustainable jobs and growth as well as preserving the environment.

In many European cities, there are brownfield areas which need to be revitalised in order to attract new jobs and investment and to improve the quality of life. I am therefore very pleased about this important initiative launched by six European partners (Hengelo, Medway, Nantes, Stuttgart, Tilburg, Torfaen). By sharing experience and by developing new innovative approaches on brownfield regeneration they can enhance urban development throughout Europe.

I am delighted that the INTERREG „North West Europe" programme has contributed to the success of the REVIT project. This form of co-operation is part of what Europe does best. Bringing people together to share ideas and to work together to make them happen. REVIT concludes as we embark on a new programming period 2007-2013 for European cohesion policy. In this period we will further strengthen networking and mutual learning between regions and cities. In fact, the European Commission has recently launched a new initiative called „Regions for Economic Change" to boost the dissemination of best practice in economic modernisation and innovation across the Union. I would be delighted if the lessons learned from the REVIT network could find their place in this new initiative.

Danuta Hübner
Member of the European Commission responsible for Regional Policy

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1

Policy Developments and Legal Aspects

1.1 The Stuttgart Soil Protection Concept – Methods, Goals, Strategies

Gerd Wolff

Abstract

Functional soil protection concepts are required for both the conservation of the local soil resources and the fulfilment of legal requirements in the area of environmental planning. Together with the Stuttgart Soil Protection Concept (in German, Bodenschutzkonzept Stuttgart = to hereby be called BOKS), I shall display how potential and actual „soil losses" can be documented with the help of a „planning map for soil quality" as part of „soil indication". In addition, I'll make it clear that this „soil indication" plays an important role in finding the targets and the pursuit of strategic solution approaches. We can see that soil protection concepts must be logical, methodically simple and easily understood if indeed they are to be any good for practical use. In order to be accepted, it is important that the soil protection concept creates awareness. This is the case when all participants of the urban land-use planning know which successes are related to reaching the goals and which consequences arise in case of failure.

Motivation

Despite the efforts of area management, as long as an enlargement of the areas of residential estates and traffic areas is unavoidable, the „consumption" of near-nature soil will continue. The demands on soil lead to losses on behalf of soil functions. The functions of soils are however a gauge for the soil quality. Any kind of use of near-nature soils reduces the surface area, and is closely linked to quality losses that must be included in the balances and strategy of environmental planning as required by the demands of the European Legal Amendment Act - Construction (EAG Bau, FEDERAL GOVERNMENT OF GERMANY 2004).

For this to be successful, we need applicable soil protection concepts defining ambitious targets. This requires soil scientific basic knowledge presented easily understandable for urban planners, and appropriate strategies and methods to achieve these targets.

How this can be ensured in a methodical manner, which decisions are to be made, and according to which aspects the rationing of the soil resources should be guided exemplifies the Stuttgart Soil Protection Concept (BOKS).

The BOKS has proven itself in practice. It was formally implemented in March of 2006 and is a permanent component of the Stuttgart urban land-use planning. In this case, the „soil loss" – that is, the demands of the soils in both quantity and quality – is measured, observed and guided according to BOKS methods.

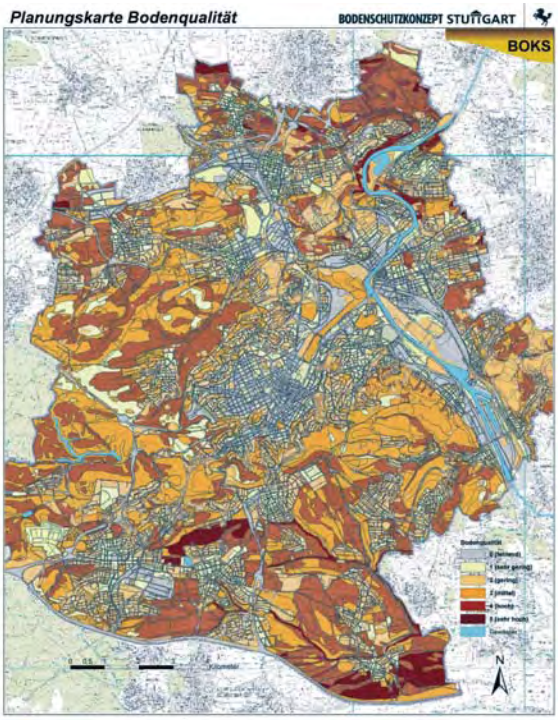

Figure 1: Planning Map – Soil Quality

Scientific-technical principles

As a result of the functional losses related to the demands of soils, the soil quality changes in a certain area. Ergo the affected soils can be determined by a „soil indication" in their quantity (= soil area) and quality (= function condition), and can be evaluated in their change.

A prerequisite for this is that the spatial distribution of the soil is known and documented in a planning-applicable manner. In Stuttgart, the „soil indication" is supported by a „Planning Map - Soil Quality" (fig. 1). This figure displays the soil quality as the sum of the soil functions to be protected as detailed by the Federal Soil Protection Act (Habitat, Ecological Balance of an Area, Filter and Buffer as well as Archive; BUNDESREGIERUNG 1998) under consideration of anthropologic function barriers such as polluted areas (LANDESHAUPTSTADT STUTTGART 2001) and cultivation (updated by the LANDESHAUPTSTADT 1989) in 6 levels (0 to 5). This map covers the entire Stuttgart area and also takes into account the quality of the urban soils based on prior mappings (HOLLAND 1995, 1996). As also known from other urban areas, urban soils still provide important functions and ecological services despite their partially massive anthropogenic override.

Methods

The sole presence of a thematic map itself is not a big help in practical planning. What we really need to know is how this map should be used in all planning considerations. Therefore reasonable methods are needed which allow a qualitative and quantitative survey of the effects related to the different aspects of soil use. with the aid of the map.

This is why the so-called „soil indication" was developed as part of the BOKS. „Soil Index Points" are calculated via the surface proportions of a planning area and the respective soil quality levels given in the planning map (fig. 2). This area-specific score will be reduced with every further demand on the soil in proportion to the regional quality loss (= loss of soil functions). In this manner, every planned use of the soil can be both theoretically forecasted and clearly measured after implementation. This area-specific score and its change are – compared to the parameter "land

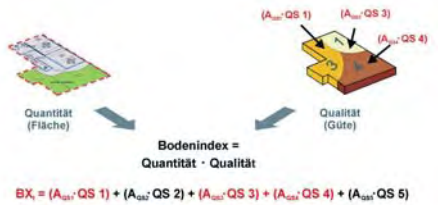

Figure 2: Soil Indication": Calculation of the „Soil Index Points

consumption" which doesn't include any statement on the soil quality – an indicator regarding qualitative soil aspects that are relevant for any further planning.

The participants in the urban land-use planning have been managing quite well with the BOKS „soil indication" because its methods are simple and easy to comprehend. It disposes of a broad range of application (LANDESHAUPTSTADT STUTTGART 2006). In this manner, it can help to assess the present state of soil and related trends, deliver impact prognosis and implement variation comparisons (fig. 3). It is also applicable to balance and control the soil specific impacts, especially in connection with intervention-balancing regulations for nature protection rights (KÜBLER 2003, 2004).

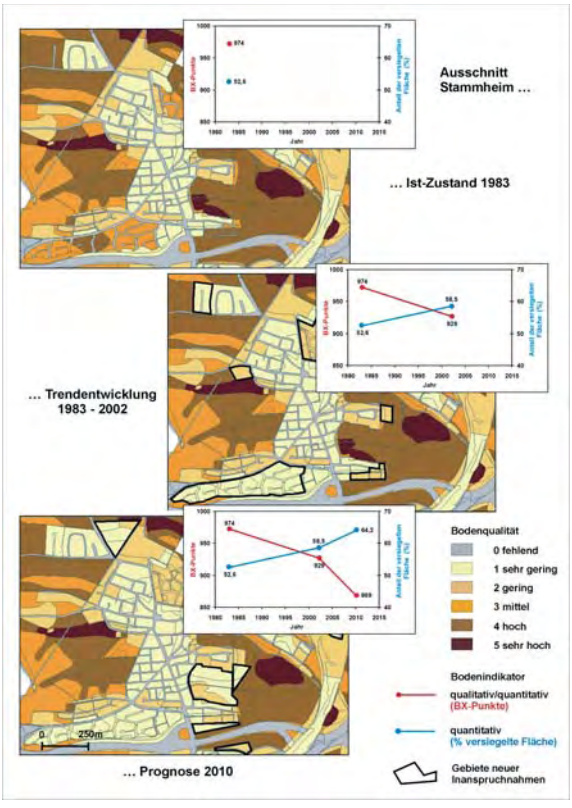

Figure 3:Field of Application of the „Soil Indication" using the example of Stuttgart district Stammheim (BX Points = „Soil Index Points")

Target Definition

Since the quality of the soil was hardly renewed in a humane period of time, rationing patterns that are based on an unchecked consumption are not fit for the future. Ultimately, sustainable approaches which ensure the conservation of soil resources at a constant quality level will contribute to the achievement of our goals.

Realistically, this target condition cannot be promptly achieved. As such, there is no way around a transitional period in which certain cut downs must be accepted. These will not necessarily be disproportionally high in comparison to the current status. At the same time, the timeframe should not be too short, in order to enable a redirection into alternative operation patterns (for example, urban renewal by revitalisation of brownfield land").

The cut-down in quality that must be tolerated for a transition period is defined in BOKS as a so-called „soil contingent". This „soil contingent" consists of a starting amount of „soil index points" that – once determined – dwindles proportionally to every soil use that is connected with a loss of soil quality. The current score of the „soil contingent" displays the correspondingly „sustainable" loss in quality. This corresponds to the acceptable „sacrifice" that can be made in accordance with the targets defined to ensure room for manoeuvre for a limited period of time (fig. 4).

The total number of points in the „soil contingent" can be arbitrarily determined in relation to the total supply of the „soil index points" of an observation area. However, it can also be calculated in correspondence to clear qualitative terms with the aid of „soil indication".

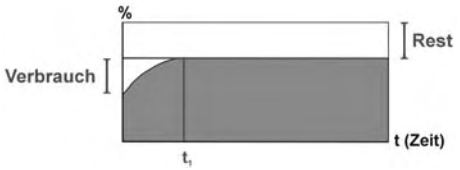

Figure 4: General orientation of the sustainable Development (Consumption = sacrifice to be tolerated, Rest = ensured resources)

This last point was the case in Stuttgart. The terms of reference here were: primarily preservation of the quantity and quality status of soils with very good and good quality. In reverse, this means that the quality proportion of middle and low quality soils is accepted to be subject for negotiation if necessary.

According to these objectives, a starting amount totalling 1000 „soil index points" (March 2006) resulted for the Stuttgart „soil contingent". This corresponded to app. 12% of the entire supply in the Stuttgart area. This „sacrificial amount" of „soil index points" can, under the viewpoints of sustainability, be considered as tolerable. However, the prerequisite for this is that an economical cultivation is determined and that the radius of operation can actually be successfully made use of.

Strategies

Conceptual soil protection cannot be solely operated with technical foundations (for example, planning map „Soil Quality") and useful methods (for example, „soil indication"), even when clear objectives (for example, „soil contingent") are established. This can only be approached if a comprehensive strategy specifies how sustainable conditions should be achieved. Thus, strategies in the field of soil protection always deal with provident resource management.

BOKS ensures this by controlling the type of point loss in the „soil contingent" that corresponds to 2 typical cultivation patterns (fig. 5).

First this is targeted „inner urban development". This is the most effective because it conserves local soil provisions or the score in the „soil contingent". For this reason, we have been concentrating the efforts on pursuing inner urban development in Stuttgart with the concept „Sustainable Brownfield Management" (NBS, LANDESHAUPTSTADT STUTTGART 2003) for quite some time.

The other pattern is the „degressive rationing" of the „soil contingent". Until land consumption will once be completely covered by inner urban development in Stuttgart, the degressive rationing of the „soil contingent" (= reduction of the annual rates of the new consumption of near-nature soils by 1 to 2 „soil index points" per year) will regulate that the point status in the „soil contingent" is never or at best just barely exhausted. With respect to the trend of the loss of points in the „soil contingent" and its respective status, a systematic monitoring (for example, every 2-5 years) helps to assess, if the target-oriented rationing works. If not, appropriate countermeasures can be established at short hand.

In Stuttgart the cultivation of a „soil contingent" proofed to be effective. In this manner, soil standards can be ensured without delimiting urban planners via a new „taboo area" in terms of protected or preferred areas. Vice versa as planners and decision makers are given room to manoeuvre in the rationing of the „soil contingent", since the access to good and

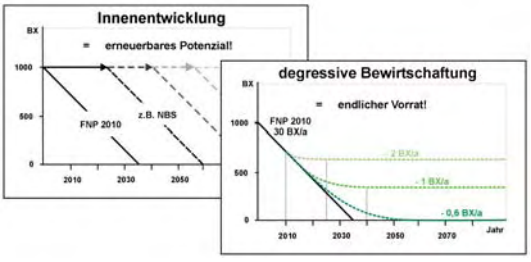

Figure 5: Rationing pattern „Inner urban development" and „Degressive Rationing" (FNP = Preparatory land-use planning; NBS = Nachhaltiges Bauflächenmanagement Stuttgart; BX/a = „Soil Index Points/Year)

very good soils cannot be categorically prohibited as it would be the case with protected areas. Their use is, fundamentally permitted, but would mean a „massive" loss and thus, an non-proportionally strong depletion in points in the „soil contingent". The monitoring quickly shows that countermeasures are required which would diminish further room for manoeuvre urgently required.

Consequences and Implications

Analysis of needs have shown that appropriate soil protection concepts require

- technical planning foundations
- suitable indication and assessment methods
- clear objectives and
- target-oriented strategies

as well as

- acceptance.

In the course of the preparatory work for BOKS, it became clear how close these individual elements need to correspond with each other. This is why the BOKS was correspondingly developed tailored to the needs urban planning practice. This ensured that the BOKS gained general acceptance and ultimately was instituted as a formal component of the urban land-use planning by the Stutt¬gart municipal council (PROVINCIAL CAPITAL OF STUTTGART 2006, WOLFF 2006, 2007).

For this, it was decisive that the BOKS had risen awareness for the risks of soil use and land consumption. It was recognised that missing the targets would not allow sustainable development. The risk of rising threats to soil resources by urban sprawl and increasing soil use is widely accepted now.

In Stuttgart, it has since become clear that possible consequences of the „soil loss" are known and their beginnings can currently be observed. Included in this are, apart from the loss of agricultural areas, a massive decrease of groundwater recharge and flood retention. That is: more and more amounts of precipitation and incidents of flooding need to be technically controlled with high costs, especially in the Stuttgart basin. At the same time, the city climate is becoming more unbalanced and the air quality is becoming poorer because of decreasing areas of operative soils available for humidity and temperature equalization as well as for absorption of air—transported contaminants. To summarize: if no sustainability can be achieved with the demands on soil, the further loss of soils will result in an escalating, irreversible deterioration of the general environmental and quality of life. This is something we cannot and do not want to allow in the urban settlement area of Stuttgart.

We can safely assume that this is also the case elsewhere. These are good prerequisites that allow us to hope that the implementation of urban soil protection concepts – like the one in Stuttgart – are then also consequently followed and favoured elsewhere.

Special Thanks

I'd now like to take this opportunity to thank the Baden-Wuerttemberg Department of the Environment and the municipal council of the Provincial Council of Stuttgart. You have each provided half of the financial or other respectively related means necessary for the development of this soil conservation concept.

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1.2 Towards Integrated Regeneration Policies and Brownfields Advocacy in the Czech Republic

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ABSTRACT

Research in 2002 revealed that the main barrier to brownfields reuse is the lack of know-how and paucity of local language-based sources of information. This paper will examine how such know-how gaps have been bridged over the past five years through policy changes at all levels of government. This paper will review policies of individual ministries; examine the development of various brownfields regeneration programs; and, analyze the stony and winding path towards the Czech Integrated Regeneration policy. In parallel, the paper will analyze the development of know-how and capacity by policymakers at the regional- and local-level in promoting and addressing brownfields reuse and regeneration. The authors will briefly comment on real estate market uptake of brownfield development and on the development of the private sector's understanding of complexities related to brownfields reuse. The authors will explore why, despite a relatively high economic growth rate, a large number of brownfield sites remain underused and superfluous to market.

Introduction

By the end of the 1990's a majority of Central European countries were faced with growing problems related to brownfields. Unfortunately, there was little understanding of the novelty among policymakers. Some countries were more fortunate than others to obtain assistance on revitalizing their brownfields. The Czech Republic was among those to receive assistance in encouraging brownfield reuse from several independent and outside actors. Until 2003, a majority of local institutions did not address the subject of brownfields and therefore, the size of the problem was unknown and data was nonexistent.1 In short, brownfields were not a national priority. International programs and assistance has visibly changed this situation and as a result there is now financing to carry out brownfields research and prepare brownfields programs.

Today, brownfield regeneration in the Czech Republic is starting to draw local and international investors' interest. This paper will review the results of programs from 1997 to 2003 by analyzing data published by CzechInvest, a national investment promotion agency. Since 2006 CzechInvest has made its data available to the public, thereby substantially increasing transparency. The CzechInvest data reveal that half of identified brownfield sites are located in small communities below 2000 inhabitants. Since these brownfields are located on the periphery they tend to be superfluous to the market. Small- and medium-sized local authorities need help from regional or district agencies to at least mitigate the threat that brownfields sites pose to the public.

Local communities have the power to deliver a sustainable Urban Agenda. First, local governments need to be empowered and educated on the tools available to

them.[2] The responsibilities of local authorities can be divided into two categories. The first category consists of a specific set of administrative tasks, as stipulated by the state. In general, the state provides local governments with assistance in compliance. The second category is trickier because they are self-regulated and carried out by the local elected government. The setting of an urban development agenda falls under this category. Unfortunately, for the second category, officials are not required to meet specific qualifications or go for continuing education.

This lack of skills on the part of the local authorities is one of the main barriers to developing a workable urban regeneration strategy or to leading an integrated urban development approach. Local conferences have significantly increased the capacity of local policymakers and planners [3] and have even resulted in policy changes at all levels of government. Unfortunately, this improvement in policy has not yet resulted in the integration of brownfields regeneration into a wider context of Integrated Urban Regeneration. Furthermore, necessary remediation programs are often neglected by structural funding programs, which must, by definition, comply with the Lisbon Strategy's emphasis on economic growth. Therefore, for environmental clean-up programs to take place, the regional or national government need to take responsibility for funding and setting up the management structure. This is not happening and this paper will offer some insight as to why.

EU membership focuses attention on national policymaking and has resulted in an increase in development-orientated policies. Therefore, this paper examines some of the funding programs that are available for brownfields regeneration in the Czech Republic, in particular Structural Funds (SF). We conclude the paper with policy recommendations and an analysis of what is missing in Czech policy.

International efforts to raise awareness and increase local advocacy

International actors and international programs have significantly helped to raise awareness of brownfields in the Czech Republic on the national policy level. As early as 2003 brownfields were placed on the National Development Plan 2004-6, a document that sets priorities for structural funding programs.

International efforts to support brownfield reuse were aimed at various beneficiaries. Upon reflection it is clear that not all intervention efforts achieved the same level of success. For instance, initiatives targeting local governments were mostly unsuccessful at changing policy or instigating local action and projects. This was mainly because at the time of intervention, local governments lacked capacity and did not receive help in filling knowledge-gaps. There was also a lack of financial backing to realize projects. In contrast, projects that targeted the national-level development agency and two local NGOs resulted in policy changes and implementation successes. It is interesting to note that the EU financed programs had very limited national policy impact until the Czech government promulgated Decree 1100 in mid-2005. Decree 1100 required a National Brownfields Strategy to be delivered by the Ministry of Industry (MPO). By then the MPO had already had some experience with brownfields regeneration and was implementing a national and EU funded programs supporting industrial use brownfields regeneration. After some initial uncertainty, the MPO realized that in order to deliver such a strategy it would have to follow the recommendation of the PHARE project (see item 8 in Table1) and that they would need the following:

- Data
- Sectoral and stakeholder cooperation and input
- Institution that can execute the pre-

paring and delivering of the strategy.

CzechInvest (www.czechinvest.org) was appointed to be the executing agency. The long awaited brownfields strategy (by now more than one year late) is expected to be unveiled in Summer 2007 as a part of the CzechInvest project Brownfields 3000. Brownfields inventory data that were gathered by the CzechInvest over the year 2006 will help not only to support this Brownfields strategy formulation, but also to publicize the subject and support absorption of brownfields projects financed from the various structural funds. CzechInvest chose data parameters that would help to highlight the country's larger brownfields sites that fall under an Objective 1 in Czech Republic's 13 Regions. In each of these regions now more than 200 brownfields were identified and registered. The entry parameters for each site were stipulated to be a minimum of 2 Ha and a minimum of 500 m^2 for each building. Over 3000 brownfields were identified, hence the title, Project Brownfield 3000 (see Box 1).

BOX 1 – Project Brownfields 3000

CzechInvest was appointed to prepare and deliver a nationally supported brownfields reuse support action. This is why the CzechInvest introduced the project **„Brownfields 3000"**.

Project „Brownfields 3000" was developed as a response to a study on inventorying brownfields that was carried out by CzechInvest in 2006. The main goals of this project are first, to guarantee a supply of successful projects; second, to guarantee public co-funding for projects; third, to initiate suitable amends to legal framework; and forth, to initiate and assist preparation of realizable projects.

The study on inventorying provided data on 3096 brownfield sites which cover 11 060 Ha and a build up area of 22 609 Ha. The study found that 40% of brownfields sites were previously used for **agriculture**, 30% were used for **industry**, 10% for **state-owned buildings**, 6% for the **military**, 4% for **housing**, and 10% for **other**.

Demographic analyses of the brownfield sites reveal that smaller communities often have the most brownfield sites. The Brownfields 3000 study specifically found that 51% of the communities have up to 2000 inhabitants, 27% of the communities have between 2 000 and 10 000 inhabitants, 13% of the communities have between 10 000 and 50 000 inhabitants, and 9% of the communities have more than 50 000 inhabitants.

Environmental damage is also a grave problem for many of the communities studied. Brownfields 3000 revealed that 40% of the brownfield sites can assumed to be contaminated, 6% of the sites have confirmed environmental damage, 53% of the sites have no damage, and in 1% of the sites it is undetermined whether there is damage.

The outcome of this project is a comprehensive Czech Strategy for regeneration of brownfields and the setting up of an implementation system that would enable its deliverance. The main goal of such a strategy is to support brownfield reuse and prevent sites from turning into brownfields. Based on the results Brownfields 3000 study, the following strategy for the prioritization of brownfield sites was created:

Prioritising site remediation

Location of brownfield Brownfields size classification: • Large (above 10 Ha) • Medium (5-10 Ha) • Small (2-5 Ha)	**Priority 1 for brownfields with** • Substantial economic effect • Risk to public environmental damage • Historical/cultural value	**Priority 2 for other brownfields**	**Priority 3 for small or badly located brownfields**
A - in urban centers	*Large and medium sites* • Industry, • housing, • commercial and public facilities	*Medium sites* • Industry, • housing, • commercial and public facilities	*Small sites* • Industry, • housing, • commercial and public facilities large and medium sites • agricultural
B - in suburban locations	*Large and medium sites* • Industry, • housing, • army use	*Medium sites* • Industry, • housing, • commercial and public facilities	*Small sites* • Industry, • housing, • commercial and public facilities *Large and medium sites* • Agricultural • leisure uses
C- in hinterlands and rural locations	*Large and medium sites* • Airfields, • agriculture	*Medium sites* Airfields, • agriculture	*Small sites* • Industry, • housing, • agriculture *large and medium sites* • agricultural, • ex mining

*Prepared from information provided by the CzechInvest, www.czechinvest.org

BOX 2 Catastrophe driven brownfield demolition program

In the Czech Republic the issues of mitigation program for brownfields have did not come up until the 2007. In early 2007 some local thieves were helping themselves to metal from a brownfields site which stood in a middle of a small community. Unfortunately after having its structural supports sufficiently impaired the building collapsed on the thieves, spilling over onto the pavement. One of the thieves lost its life. Public outcry against the danger to the public from the dilapidated brownfields sites has reverberated throughout the media. The following week at another location a similar scenario occurred. This time two thieves died. Community leaders protested and regions complained that they did not have any funds to provide for public safety. Government acted swiftly and all the regions were promised ca. 300 000 Euro each to deal with public danger and emergency issues on brownfields properties.

Locally driven efforts to drive brownfields regeneration

Various international initiatives have gradually improved Czech stakeholders' ability to understand the importance of the brownfield issue. Unfortunately, this increased understanding has not yet resulted in concrete brownfield reuse. For example the Czech Ministry of Environment (MZP) have been lucky enough to have the same leadership for 8 years, which is a quite unusual for a Czech national institution. In 2003-4, on the grounds of promoting sustainable development, the MZP took the initiative and attempted to bring together all stakeholders with knowledge and a stake in brownfield development. The MZP financed its first ever research on brownfields (see item 10 on Table 2) and set up a coordinating working party with other ministries. Unfortunately, the Working Party remained inactive due to lack of political will. On the positive side, the research paper and MZP's initiative have resulted in research funding for brownfields related priorities not only at the MZP but also at the brand new research program of the Ministry of Regional Development (MMR).

The lack of sectoral cooperation and a lack of understanding have meant that research projects are often redundant and have incompatible methodologies for the inventorying of brownfields. Although, some of these inventories successfully produced analyzable data on the actual state of brownfields in a given administrative area. These activities have also pushed the MPO/CzechInvest to hold onto the leadership of brownfield issues.

BOX 3 – Improving the REALITY

REALITY was a very popular measure from the Czech Operational Program Industry. Program was accessible to private and public investors who wanted to build, redevelop or improve premises for industrial use. 70 000 Euro was allocated for the funding of REALITY for 2004 - 2006. This program was not exclusively brownfield property, but some brownfields projects were realized.

The Program measure was oversubscribed, and an improved and even more flexible program measure is being prepared for the period of 2007-20013. In this program 1 373 million Euro will be devoted to development of industrial property including regeneration of brownfields.

Zambelli-České Budejovice – Brownfields revitalization project from the OP program Industry – Priority measure REALITY- SF program support 46% from the recognized expenditure

Beneš a Lát – Semily - Brownfields revitalization project from the OP program Industry – priority measure REALITY - SF program support 46% from the recognized expenditure

Source: CzechInvest

Table 1: Development-related policy and strategy making in the Czech Republic (2004-2006)

	Name of the policy or strategy	Web reference	Approved	Language
1	National development plan	http://www.strukturalni-fondy.cz/	approved 2006 by government decree	English
2	National strategic reference framework		Approved 2006 by government decree	English
3	Czech implementation of the Lisbon strategy	http://www.vlada.cz/assets/cs/eu/oeu/lisabon1/ls_a_cr/npr_cr/national_reform_programme_en.pdf	Approved Sept. 2005	English
4	Strategy of regional development policy 2007-13	http://www.mmr.cz/index.php?show=001024004003	Approved 17. 5. 2006 by government decree no. 560	CZ
5	Strategy for the economic growth	http://www.hospodarskastrategie.org/shr/docs/summary_en_web_final.pdf	approved 16. 11. 2005 government decree	English
6	Strategy for sustainable development	http://www.env.cz/AIS/web-pub.nsf/$pid/MZPISF7Z6L7V/$FILE/SUR%20%C4%8CR_FINALlistopad2004.pdf	approved 8.12 2004 by government decree no. 1242	CZ
7	National research policy	http://www.vyzkum.cz/storage/att/56C8E7464195C2254D08BB47A3842D60/npvav2005.pdf	approved 7.1.2004by government decree no. 7	CZ
8	Spatial development policy	http://www.mmr.cz/upload/files/uzemni%20planovani%20a%20stav.rad/Politika_UR.pdf	approved 17. 5. 2006 by government decree no. 561	CZ

The first research results available in late 2005 were interesting mainly because they confirmed estimates of findings that were included in the closing report of a PHARE-financed project. In that report it was hypothesized that a majority of brownfields in the Czech Republic are not former industrial sites. Brownfields in the Czech Republic are a much broader socio-economic issue that requires wider access to public funds. The reason, as explained above, is that a lot of brownfields are not strategically located, and therefore, public intervention is needed to either revitalize them or to provide for environmental clean-up.

Data collections efforts have revealed that in smaller communities it is misleading to ignore plots less than ½ hectare. For instance, when all the known brownfields were identified in the Votice administrative district, out of ca. 80 brownfields, only one was of an industrial origin. Around 50% of identified brownfields were smaller than ½ Ha. Furthermore, the smaller these brownfields were, the infrastructure was built on the site. As Box 2 shows, in smaller communities even a small brownfield can pose a threat to the public. In order for the local authorities to combat this threat, they need funding and sufficient expertise.

EU Structural Funds as a Catalyst

European Union programs have served as a substantial catalyst national level policy reform. Several policies were developed in line with particular Structural Fund (SF) demands. From 2003-2006, there was a substantial amount of policy reform, as illustrated in Table 1.

These policies have not only given the framework for future programs, but also pressured the Czech government to accept a new way of making policy and delivering strategies [4]. These various development-orientated policies have paved the way for urban regeneration and brownfield regeneration.

To have correct policies, strategies and priorities at national, regional or even at the local level is not all that is needed. It is also necessary for the actual brownfields revitalization to occur. Policymakers in the Czech Republic realized this during the first wave of structural programming 2004-2006. The ability of local beneficiaries to absorb the available programs

benefits was another matter. This will however be dealt with in a later section of this paper.

The EU initiative for the urban agenda

The EU's broadening of the scope of Objective 1 to include the urban dimension have allowed the brownfields issue to be moved from a singular, disconnected subject (where it lingered for a number of years) to be integrated into the wider context of urban regeneration. Within this context of urban regeneration, there is more room for the issue of brownfields to be integrated with other issues and into broad partnerships across sectors. Reusing or cleaning up a single brownfield cannot significantly impact the social or economic situation of a locality. Therefore, programs on integrated urban regeneration should emphasize partnerships, support of private businesses initiatives. Only within the broader integrated urban regeneration approaches can all the aspect of brownfields regeneration be properly achieved. The Integrated urban regeneration programs for Czech cities above 50.000 inhabitants are part of the 7 Regional Operation Programs for the period of 2006-13. Only time will tell if these programs actually hit their targets.

Although the authors believe that it would be more effective to embed the brownfield issue directly into the EU drive for urban regeneration, as stipulated in Objective 1, we do have some concerns that moving brownfields under the exclusive domain of urban regeneration would result in the issue being neglected at the Czech national level. Furthermore, urban development is currently the responsibility of local authorities and it is unlikely they would willingly give up their authority to national level actors. We are also concerned that the national level currently lacks understanding of urban regeneration and does not yet know how to provide support to local authorities. Only by giving local authorities the proper training can Czech local authorities compete at the EU-level for funds to conduct urban regeneration.

Initial efforts to use Structural Funding for brownfields (2004- 2006)

As explained above the pro-brownfields policies and priorities in the Structural Operational Program in the Czech Republic enabled various brownfields regeneration projects. Some pilot brownfields regeneration projects were even funded by PHARE and ISPA. But these projects were few and far between and the capacity to lead such projects were often lacking. Projects often suffered from false assumptions about project preparation timing and underestimation of technical complexities. All these knowledge-gaps backfired and reduced the effectiveness of structural funding programs carried from 2004-2006. In hindsight it is clear that had substantial technical assistance, education and project preparation support been offered as early as 2003, there would have been much more brownfields revitalization.

The failure to use the structural funds for regeneration of brownfields properly was most obvious in the implementation of operational program for Prague, the JPD2. The JPD2 was an Objective 2 program and allowed for broad urban regeneration activities. Brownfields were excellently stated as a priority and sufficient funds were allocated. However due to an absolute lack of capacity on the part of local authorities, the project has failed to result in the revitilization of brownfields. Fortunately, the real estate market in Prague is buoyant and on-the-rise, and so brownfield revitalization in Prague will probably be paid for through market forces.

The 2007- 2013 Structural Funding programs and their brownfields priorities

For the period 2007 -2023 in the Czech Republic there are 25 various Operational Programs (double what they were in the previous period). This has the potential to cause much confusion for the SMEs,

Table 2a: Sectoral programs and their brownfields priorities

OP	**OP Industry and Innovation**	**OP Environment**		**OP Rural areas**		
Program main goals	5. Environment for an enterprise, innovation and and real estate support program	4. Waste and removal of the old environmental damage	6. Improvements to environment and countryside	1.Competitiveness of agriculture and forestry	3.Rural area and diversification of economic activities	
Program priority	**5.3 Infrastructure for enterprise**	**4.2 Removal of the old environmental damage**	**6.5 Regeneration of the urbanized environment**	**1.1 Restructuring of the capital base**	**3.1 Diversification of economic activites**	**3.2 Quality of rural life**
Supported activities	• Environmental damage removal • Demolition • Infrastructure construction • Reconstruction • Expert consultations • Project preparation	• Environmental damage removal • Risk analyses • Inventarization and categorizations	• Demolition • Planting			
Size limit	Land larger then 2 Ha or 500m^2 of build up area	Not limited	Not limited		Communities up to 2000 people	• Waste and public services up communities up to 500people, • Sewage clearing plant- communities up to 2000 people
Future use	Min 50% industrial	Not limited	Green and recreational areas, national parks, NATURA	Enterprise, small enterprise, truisms, historical values	Farmers	
Previous uses	Not limited	Mining, landfills, risk to environment or health	Not limited			Community or a partnership of communities
Beneficiaries	• Community • Partnership of communities • Regions • Private enterprise • CzechInvest	• Community • Partnership of communities • Regions • Public companies • Private enterprises • NGO	• Community • Partnership of communities • Regions • Public companies • NGO	Farming enterprise	• Farmer, • Member of a farming cooperative • Non farmers only for tourism • NGO only for tourism • Religious organization • Interests organizations	
Grant amount	• Costs+15%-market value • Regional map decides % • Reconstruction 40%	EC condition re environmental protection apply	EC condition re environmental protection apply	• 50-60% for young farmers • 40-50% other farmers	50% Min cc 2000 Euro	• 50% private enterprise • 100% community partnerships • 90% NNO and religious and other orgs
Conditions	Business sustainability 5 years	Beneficiary is not a polluter	Demolition only in areas of spatial value			
Total priority allocation	1 373 million EURO	913 million EURO	687 million EURO	325 mil EURO	316 mil EURO	304 mil EURO

Table 2b: Regional operational programs- comparison of their brownfields priorities

OP	ROP NUTS North Moravia			OP Environment		
Program main goals	2 regional prosperity support	3 Urban development	4 Rural development	3 sustainable communities development	3 Rural development	3 Rural development
Program priority	**2.3 Support for brownfields reusee**	**3.1 Regional development poles 3.2 Subregional centres**	**4.1 Rural development**	**3.1 Development of major urbanized areas**	**3.2 Development of subregional centres**	**3.3 development and stabilization of rural communities**
Supported activities	• Decontamination? • Demolition? • Infrastructure development • Reconstruction • Surveys and databases • Revolving project fund • Land ownership cohesion assistance • Education • Partnerships, PPP	• Decontamination? • Demolition? • Infrastructure development • Reconstruction • Best practice exchange	• Infrastructure development • Reconstruction	• Demolition? • Infrastructure development • Reconstruction	• Demolition? • Infrastructure development • Reconstruction	• Demolition? • Infrastructure development • Reconstruction
Size limit	Other reuses no limit Industrial up to 5 Ha	No limit	Communities up to 1000 inhabitants	• Enterprise up to 5ha	• Other reuses no limit • Industrial up to 5ha	• Other reuses no limit
Future use	• Above 5 Ha 50% other use than industrial	• Historical monuments, • Residential, • Public space, • Public services • Enterprise	• Historical monuments • Residential, • Public space, • Public services • Enterprise, • Tourism	• No industrial use • Business use?		• No industrial use • Business use?
Previous uses	No limit	No limit	No limit	No limit	No limit	No limit
Beneficiaries	• Community • Region • Community companies • NGO	• Community • Region • Community companies • NGO	• Community • Region • Community companies • NGO	• Community • Region • Community companies with more then 50% public own. • NGO • SME	• Community • Region • Community companies with more then 50% public own. • NGO • SME	• Community • Region • Community companies with more then 50% public own. • NGO • SME
Grant amount	• Regional map 40% • Revolving fund	• Regional map 40% • Jessica revolving fund	• Regional map 40	• Regional map 40%	• Regional map 40%	• Regional map 40%
Conditions	• Possibility of cross financing	• Priority 3.1 must produce an integrated development program	• Integrated projects	• Must produce an integrated development program • Cross financing only 10%	• Integrated projects • Cross financing only 10%	• Integrated projects • Cross financing only 10%
Total priority allocation	229 mil EURO			?		

NGOs and the small- and medium- sized local communities. Tables 2a and 2b describes those programs in detail. At the time of writing this paper the individual operational programs are settled, mostly approved at the national level, but are not yet approved by the EU. Therefore, all the information in Tables 2a and 2b are only tentative.

During 2007-2013 in the Czech Republic 25 operational programs were prepared. Apart from the expense extravagance of having 25 managing and 25 monitoring agencies, Structural Funding Operational Programs are also burdened with too many priorities. With an average of 4 main goals per program and 4 priorities to each of the goals, there are at least 400 various priorities (although some of these priorities are location-specific). There are 15 Operational Programs to consider with a minimum of 60 main goals and around 250 priorities to choose from. Although this will prove difficult for applicants, there are positive ramifications for brownfields since brownfield revitalization is applicable to many of the priorities. Apart from sectoral programs, (see Table 2a) which have useful brownfield priorities, The Czech Republic has 7 Regional Operational programs (ROP) at the level of NUTS[1] 2. The need for brownfield regeneration for each of the regions varies considerably.

Table 2b compares approaches to brownfield regeneration across regions. To illustrate the differences between regions in terms of brownfield priorities Table 2b compares the approaches toward brownfield revitalization of the North Moravian and South East (both NUTS 2 regions). North Moravia has an exceptionally large number of brownfields, especially in the City of Ostrava. One must remember, however, that the Operational programs have to be approved by the EC, and judging by the previous program period, things may change substantially.

The absorption initiatives for the Industry Operational Program (OP) have already started with the inventorying and promotional activities carried out by CzechInvest. This time most of the programs also include project preparation funding. The other brownfields regeneration possibilities are, as already stated, embedded in the 7 Regional Operation Programs and also in the Rural Development Program (financed from the EAFRD fund). There are possible brownfield-orientated programs also in the Operational Program Environment and at the national and regional level. Capacity Building programs at the national level are missing. Until now, these types of programs have only been regional-driven, thereby hindering a coordinated dissemination of such knowledge. Therefore, it is likely that the long-awaited "Brownfields Strategy" will stress more capacity-building issues.

Conclusion

This paper shows that sustainable land use needs to be addressed in broader terms in urban regeneration policies. To bring brownfield sites back into productive use the Czech Republic needs to make brownfields a cross-cutting theme that links across all land use-related policy areas. For properties where revitalization is not possible, at the very least it is necessary to enact mitigation measures so that threats to the environment and society are reduced. The topic of brownfield should not belong to one ministry, or to one-single level of government, be it local, regional, or national. For sustainable land use policies and urban regeneration to take place, coordination between all actors, across all sectors and policy levels, need to cooperate. A summary of the key barriers to reusing brownfields can be found in Table 3.

1 NUTS stands for "Nomenclature of territorial units for statistics"

Table 3 – Breaking barriers to brownfields development

Leadership at national, regional and local level 2002	**Leadership at national, regional and local level 2007**
• Need for brownfield leadership that can coordinate the many measures, policies, and administrative linkages necessary to get more urban brownfield properties "unstuck," and into productive use.	• Emerging at the national level • Leadership is still lucking at regional level and at a local level
Know-how, coordination, and motivation 2002	**Know-how, coordination, and motivation 2007**
• Inadequate understanding of the scope of the brownfield problem	• Improved, data for large sites available, • Profiles of the actual regional brownfields problem are not yet available
• Inadequate understanding of its financial and social implications in all levels	• Improved, but not jet reflected much in local policy
• Low levels of political commitment to brownfield reuse in all levels	• Improved but the inadequacies of grasping the issue are preventing the focusing of the political commitments
• Absence of an overall brownfield strategy mainly in national level, but also in the lover levels	• Improved. Project 3000 will deliver a brownfields strategy • Country also has a number of development related policies and strategies (see Table 1)
• Inadequate cooperation and knowledge-transfer among institutions, and departments within institutions	• Improved, appointed a coordinating agency, however it does not yet coordinate all the stakeholders, but only some.
• Inadequate cooperation and knowledge-transfer among disciplines	• Remaining
• Inadequate know-how across the full range of potential brownfield stakeholders, including private investors, local authorities, regions, and ministries	• Improved, but still substantial luck of know-how in a public domain, which relates especially to the development issues • Some of the private market is catching up
Tools and policies 2002	**Tools and policies 2007**
• Lack of clear cut policies and strategies	• Brownfields strategy under preparation • The spatial and environmental policy and strategy of economic development in existence (see Table 1) • Wider urban policy is missing
• Insufficient transparency and enforcement in the legal system in several areas that impinge on brownfields planning, purchase, and use	• Market skills improved and learn to work with legal insufficiencies • Difficulties in enforcements continue
• Lack of means to insure or cap environmental liabilities	• Continues
• Inadequate tools for land assembly	• Improved slightly by the new panning an construction law 186/2006 sb. but the right tool is still missing
• Inflexible planning tools	• Continues despite the new law
• Insufficient fiscal instruments and incentives	• SF programs provide breath of fiscal instruments, well sorted out especially for industrial regeneration
• Lack of a unified registry of sites and their critical parameters	• Registry exists for 3000 larger sites • Some districts and cities have their local registries
• Lack of analytic tools and principles for prioritising site investment	• Some of the analytical and prioritising techniques are contained in the SF programs
• Lack of benchmarking of the technical and other costs and procedures against international best practices	• Still missing
Broader market milieu 2002	**Broader market milieu 2007**
• A vibrant expanding market	• In existence, economy is doing well 6% GDP growth sustained for nearly 2 years
• Local public sector finance (for the less prime and heavily damaged sites, to match private sector or EU funding	• In existence, but sparsely used in past because the skills to develop brownfield land were missing
• Greater restrictions on the ready availability of greenfield sites. (This availability represents hidden subsidies to greenfields, in the form of infrastructure extension, and, in the long term, support for inefficient spatial structures. Thus this item could be rephrased as "removal of greenfield subsidies	• Some restrictions are contained in the new planning law and the National spatial policy. • Not all the greenfield development substitutes yet removed

Policy Recommendations

- Shift the policy approach away from solving individual brownfield problems to integrating brownfields into the broader theme of integrated urban/regional regeneration;
- Provide usable development tools, especially in respect to aiding local authorities to increase their agility in the planning process;
- Provide additional assistance to stakeholders and local authorities in building capacity and assisting them to gain skills so that they will be able to deliver an integrated urban approache;
- Assist regions to understand their brownfields problems, especially issues related to environmental mitigation measures;
- Address the astounding reality that 78 % of identified brownfields are located in communities below 10 000 inhabitants and that these communities generally will not have the experience or administrative capacities to provide technical assistance to the owners (72% of these properties are privately owned). (Additionally, most of these communities and their brownfields are not located in attractive locations, making it less likely that the market will demand urban revitalization.)
- Within the Brownfield Project 3000, provide support for stakeholders and include their input in policy and legal changes.
- Support regions to intimately get to know the nature of their brownfield problem and to develop their programs accordingly.
- Support urban development educational programs focused mainly on local authorities.
- Require self-governing local authorities to acquire strategic and land use planning skills.

Refrences

[1] Jirina Jackson and Yaakov Garb, "Facilitating brownfield redevelopment in Central Europe: overview and proposals", Institute for Transportation and Development Policy (ITDP), www.itdp.org

[2] OECD Economic department paper 499/June 2006: "Improving public efficiency in CR regions and municipalities" for a description of the Czech local authorities and their powers.

[3] For example the last Czech brownfields conference organized by the Czechinvest http://www.czechinvest.org

[4] Jirina Jackson, Yaakov Garb – The search for the brownfields leadership in the Central European Cities

[5] See also the OECD report requested by the Czech government „Organizing the Central State Administration Policy and Instruments" OECD 2006, www.oecd.org, Czech Republic country page

1.3 Liability and the Long Term: Effects on Sustainable Urban Regeneration in the UK and USA

Kris Wernstedt, Peter Meyer, Tim Dixon,Kristen Yount,Poulomee Basu

ABSTRACT

Brownfields pose exceptional investment risks and opportunities for private investors but also offer the promise of more sustainable human settlements. Local authorities, regional development agencies and nation states all can benefit from mitigation of environmental risks and redevelopment of urban lands. US and UK experience suggests that such regeneration is most likely to be involve public-private collaboration. Given very different motivations and measures of 'success' in appraising the results of their investments, the allocation of project risks between the two actors can shape the potential for genuinely sustainable urban regeneration. This paper models and compares the impacts of liability structures and related institutional and cultural factors on public and private redevelopers and on sustainable regeneration in the UK and the US, focusing on the issues raised by 'clean for use" remedial responses that leave contamination on site.

Introduction

Brownfields pose exceptional investment risks and opportunities for private investors – but carry the promise of a substantial contribution to more sustainable human settlements. This statement applies to previously developed sites, but is particularly true with respect to the US meaning of the 'brownfields' term – land burdened with real or perceived contamination. It is in the interest of local authorities, regional development agencies and national states that previously developed lands be regenerated for new uses and that any environmental damage or risks associated with prior uses be contained and future damage mitigated.

Experience in the US and UK suggests that such regeneration is less likely to be undertaken solely by the public or private sectors, but rather through collaboration. While there are many 'hot' real estate market settings in which land values make private investments profitable with no public support, such conditions are the exceptions for environmentally suspect properties. Public-private collaboration will thus characterize much of the regeneration effort.[1]

A central element shaping such collaborations is the allocation of environmental and economic risks. On the private side, parties involved include the owners or prior occupants of previously developed sites that may be liable for cleanup, as well as redevelopers and their financiers. Public actors may include economic development and environmental protection offices at the local and regional level. Each party has its own unique priorities

1 Higher average property values in the UK make it easier for the costs of site remediation to be covered by the value increment generated by any site re-use: Median home prices were £172,065 in the UK in 2000 while owner occupied units (excluding rentals, generally worth less) averaged only $167,500 in the US -- less than half as much, at an exchange rate of about $2 to £1.

and objectives. Thus the potential for collaboration depends on the extent to which the policy regime in which they operate enables them to serve their needs.

One key element shaping the allocation of risks is the distribution of liability for past damage and future environmental, economic and social impacts across the interests involved. The liability consists of three distinct current and potential future costs

- Initial site mitigation and possible future cleanup costs, as required due to new findings on toxicity or ecological damage, discovery of more contaminants on site, or failure of the previous response;
- Charges for private property and ecological damage off-site due to the conditions permitted to remain as part of the remedial response; and,
- Claims for bodily injury to persons on and off site due to residual pollution permitted to remain on site.

The allocation of responsibility for these risks can shape the potential for truly 'sustainable urban regeneration' that transcends the short-term real estate benefits and favorable media coverage of a successful brownfields development.[2] Both the decision on intended land use and the associated remedial response (and decisions about retention of some contaminants on site) affect the sustainability of the investment in regeneration.

This paper compares the impacts of liability structures and related institutional factors on sustainable regeneration in the UK and the US. We focus primarily on risk-based or "clean for use" remedial responses that leave contamination on site, and the roles played by expectations of future problems associated with such actions.

We proceed as follows. First, we briefly summarize sustainable urban regeneration in the UK and US, emphasizing similarities and differences in the institutional environments and regulatory/liability regimes in which redevelopment of previously used properties takes place. We then develop an analytical model that presents a simplified decision model for public and private actors involved in regeneration. In the fourth section, we use this model to examine the possible behavior of each actor, focusing on the incentives they face in the management of long term liabilities at regenerated sites. We conclude by assessing the extent to which those incentives and the social and regulatory contexts in the two countries support sustainable urban regeneration.

Background

The supply and demand for land regeneration in the UK and US exhibit surprising similarities, despite their idiosyncratic urban and industrial development histories and institutions. A population density in the UK an order of magnitude greater than that in the US and a desire to preserve rural heritage have led to the central government's target for 60 percent of new housing to be sited on previously developed land. No comparable nationwide target for any form of land reuse has come into play in the US, yet heightened interest in urban living working through the private market and state and local public efforts to preserve greenfields has powered urban and brownfield redevelopment. New state and local 'smart growth' initiatives, if implemented, may eventually generate a comparable press to reuse previously developed sites.

2 Sustainable' is a much-overused label. In the UK, there has, been increased debate over the concept (see Dixon 2006). ‚Sustainable brownfield regeneration' is founded on the three pillars model, evident in the RESCUE (2003) provision of a EU-wide definition of ‚sustainable brownfield generation':
‚…the management, rehabilitation and return to beneficial use of brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context.
Similarly, Williams and Dair (2005) suggest a ‚sustainable brownfield development' is one:
'… that has been produced in a sustainable way (e.g. in terms of design, construction and participation processes) and enables people and organisations involved in the end use of the site to act in a sustainable way'

A striking difference does exist on the supply side of regeneration with respect to available alternative sites. The 60,000 hectares of previously developed land in England that are capable of redevelopment (English Partnerships, 2006)—and an additional 60,000 hectares similarly underutilized and stressed but unavailable for redevelopment—may be close to the total areal extent of brownfields in the US, according to one estimate.[3] However, the US is 70 times the size of Britain. There is thus a physical need, not just market incentive for reuse in the UK.

The two countries' institutional responses to address these stresses do share some core features. Perhaps more critically, the "suitable for use" principle that is the foundation for remediation requirements in the UK and the risk-based approach to remediation that most states allow in the US are closely aligned. Both approaches relate cleanup to anticipated use at a remediated site, allowing residual contamination to remain if potentially harmful exposure is controlled through land use activities permitted at the site (hereinafter land use controls). Similarly, the 'polluter pays' principle and the strict and retroactive liability of responsible parties arising from the federal law in the US that frames brownfields policy—the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—have clear analogs in the UK under Part IIA of the Environmental Protection Act (EPA). In addition, third party damage claims are allowed in both countries.

In the US, CERCLA's provision for joint and several liability permits regulators to hold a single responsible party liable for all costs, irrespective of the total portion of contamination that its activities caused. This leaves any party to a past pollution problem more financially vulnerable than is the case in the UK, where regulators cannot assign all liability to one responsible party just because of its ability to pay, if other relevant parties are present. Both regulatory regimes also allow several similar pathways to cleanup. Voluntary action by responsible parties to possibly reduce cleanup liabilities is possible in both the US (at least in some states) and the UK, but regulators in both countries can issue enforcement or remediation notices to compel cleanup and initiate cost recovery to recover expenses when private parties fail to act. The enforcement philosophies of the two countries, however, have differed markedly. The UK and many other EU members have traditionally implemented structured and predictably responsive approaches to enforcement. This contrasts with the risk-generating unpredictable adversarial, litigation-fraught, approaches employed in the US, although the US has arguably moved significantly toward the European model since the mid-1990s.

Given these commonalities and indications that the recent Environmental Liability Directive from the EU may promote further convergence in the realm of damages to natural resources, one may expect that the public and private sector behaviors would be similar. However, two key differences between the may create divergent approaches to 'sustainable urban regeneration'. First, the overwhelming majority of contaminated urban properties in the UK are addressed by local planning authorities who act as environmental regulators under Part IIA of the EPA. The country's Environment Agency does set standards for 'clean to use' mitigations and takes the lead on a limited number of Special Sites where, for example, pollution may be entering controlled waters. However, local authorities typically lead the effort.

3 The area of US brownfields is very uncertain. Their number is unknown since the country lacks a consistent database on past and current land uses. Estimates range from 200,000 to 1 million sites legally classifiable as brownfields nationwide. Evidence from municipalities that have developed site rosters suggests an average site size in older urban areas of less than 0.2 hectares for urban brownfields, excluding landfills, mining sites and premises still in active use, albeit probably contaminated, but including abandoned gasoline (petrol) stations (Heberle & Wernstedt, 2006). It thus is probable that the area of suspect sites located within US cities totals not more than 200,000 hectares. In a recent survey, 260 public and private parties familiar with brownfields in the US state of Wisconsin, twice as many respondents indicated that the state environmental agency had become more willing to negotiate than indicated it had become less flexible over the past decade. Among local officials responding to the survey, the trend was even more pronounced (Wernstedt & Hersh, 2006)

Under the UK's Planning and Compulsory Purchase Act, contamination needs to be taken into account in local authorities' decisions on planning applications. They impose these decisions through planning conditions and building controls. Part IIA also gives local authorities the responsibility to proactively inspect their jurisdictions for land contamination.

The UK inspection requirement and the fact that the overwhelming share of contaminated properties is addressed through the local planning authority enlarge the nexus of local public decision making and environmental considerations. In contrast, the role of local public actors vis-à-vis remediation in the US is much more limited. The federal government has delegated the authority for overseeing remediation to state-level regulators. Local governments exercise planning and code authority over site development, but any environmental regulatory power they wield remains subordinate to state requirements. Local public agencies in the US thus are less central to determining remediation alternatives, and to monitoring compliance with long-term remedial obligations, than are British local authorities.

A second significant difference derives from the different capabilities of local governments to shape their own economies. The US "growth machine" (Molotch, 1976) powered by an alliance of local government actors and elite interests, has lost some of its singular power to shape local land development over the last 2 decades with more voices at the decision table, but it still retains a high capability to influence land use decisions and profit from them. The public sector at the local level in the US enjoys full general government powers, financed 60 percent or more by local taxes on property, sales, and incomes, as well as user fees (Tannenwald, 2004). More than two thirds of these local revenues derive from taxes that typically will rise with higher intensity land uses.

British local authorities lack both the range of powers and rich local revenue veins. Overall, they raise and control only some 25% of their public sector expenditures (Simmie, Carpenter, Chadwick, Martin, & Wood, 2006). Their limited powers further weaken their relative ability to drive their local economies through their own efforts. In addition, central funding and national efforts to equalize economies across space limit the prospective gains to communities from more intense local land use. This disconnect has permitted absence of local public sector financial returns permits the emergence of different forms of urban regeneration than the "growth machine" dynamic acting on local governments in the US.

A Model of Public and Private Decision Making in Urban Regeneration

UK-US institutional differences in the locus of public decision making about environmental remediation and in the ability of local governments to raise revenue from local sources provide different incentives to private and public actors in urban regeneration. These incentives shape behavior and influence the sustainability of urban regeneration efforts. In particular, the fact that both the US and the UK tie remediation requirements to intended land uses, potentially leaving residual contamination and liability on a site, poses prospective environmental and financial risks for reusers. Future costs may arise if the controls placed on the residual contamination fail to protect human health and the environment. These risks shape investment and regulatory oversight decisions and thus the long-term sustainability of urban regeneration. Facing different incentives, similar UK and US actors tend to respond differently to the same potential residual liabilities.

Private investors interested in redeveloping a previously used property face a number of uncertainties, including those inherent in any real estate development (changing market conditions, for example), and those specific to the presence of

real or perceived contamination. The latter may entail uncertainty about both the extent of contamination and the costs of remediating it. We can assume that, even if the extent of contamination is known, the cost of its remediation is not certain since it entails negotiation with the regulator and may vary with the scale and type of proposed new land use at the site.

The relationships between actual conditions, government practices, and perceptions about liability risks are very complex. Consider the following formulation for a site under consideration for privately-led regeneration. The model ignores the external factors shaping risk perceptions, how liability costs can vary with different types of land use control failures, and constitutes a gross simplification of reality. Still, it enables us to examine interactions. Capital letters indicate functional relationships, while lower case indicates single arguments in a function:

a(t) = cost of government enforcement

C(e,R,M,U) = construction cost

e = initial environmental conditions

Gd(t,W,M) = government development effort

Ge(t,W,a) = government environmental effort

L(e,R,U,t) = residual liability

M(U,t,Gd) = market conditions around site

P(M,e,R,) = purchase price of land

R(t,U,e,L,Ge) = government required remediation

S(M,L,C,R) = sales price of developed project

t = time, where

t=0, time period of initial private investment and government environment and development decisions[4]

t=t1, date of private decision whether to continue ownership interest in project

t=t2, date of public decision regarding additional remediation requirements and development support.

U(t,L,Gd) = land use at site (control)

W(L,∏,M,U,,a) = social welfare of community

∏(P,S,C,R) = profit from site development

The private investor desires to maximize the ∏ function. Profit is the difference between the sales price or capitalized value of the property after the redevelopment and the sum of the purchase price of land, construction costs, and remediation costs. In addition, however, the site may have a residual liability attributable to the risk-based, suitable-for-use mitigation approach. This liability derives from the difference between the initial environmental conditions and the remediation requirement, land use (control) at the site, and the passage of time, as well as third party liability risks.

If we assume that the investor may suffer a cost equal to the liability, L, if the mitigation response at the site fails in the future, the overall private profit maximization function becomes:

$$\Pi = \begin{matrix} f\,[p(P,S,C,R) - L] + [1-f\,][p(P,S,C,R)] \\ [p(P,S,C,R) - f\,L] \end{matrix}$$

Where $f = f(L,t,U,R)$ = probability of failure in the mitigation response (including land use control).

Public actors in this simple model strive to maximize W. This social welfare function includes benefits to the private sector, in the ∏ argument, as well as market bene-

4 The model also could incorporate a more complex series of decisions regarding market uncertainty over time by including an integration over different uncertain market conditions and elapsed time periods

fits not captured by the investor (e.g., off-site benefits such as the appreciation of surrounding properties), land use benefits that may not be readily reflected in the market (e.g., sustainable practices), environmental contamination (represented as residual liability, the difference between initial environmental conditions and remediation), other community benefits and enforcement costs. The latter influence environmental enforcement, which efforts can change over time and depend on the anticipated social welfare benefits of remediation—and of the site redevelopment.

The public sector also has a role to play in the economic development (Gd). It can influence real estate market conditions on and around a site under consideration for regeneration, through subsidies, infrastructure provision and zoning. The effort it makes depend on the state of the local economy and the larger social welfare of the community, constrained by the resources at its disposal. It also can change over time due to shifting priorities.

Finally, the flexibility of the remediation requirement will depend on initial environmental conditions and residual liability, as well government enforcement efforts (how rigid or careful a regulator attempts to be with any given redeveloper over a particular site), and the latter also can change over time. In addition, construction costs are not fixed, but will vary depending on the type and scale of development the private market supports, and on the public remediation requirements imposed.

Behavioral Responses of Public and Private Actors

Several features emerge from the model even without a formal analytic treatment. We can see, for example, that the probability of failure in the land use control ($_f$) depends on the passage of time (t), as well as initial environmental conditions (e), the required remediation (R), and the allowable land use (U). In fact, time—an integral component of sustainability—also appears as an indirect or direct argument in other variables that shape the investment environment, including market conditions (M), remediation requirements (R), government enforcement efforts (G_e), and social welfare (W). It is central to decisions of both the private and public actors, although their responses to it may differ.

The Private Investment Decision

The private actor must decide whether to invest in the project. Relevant decision variables essentially reduce to the construction function (C) and, subject to approval by the regulator, the level of residual liability (L) to leave on the site. At t=0, leaving more residual liability, L, on site reduces remediation costs, but may reduce future project cash flows if it forces a less remunerative use or, equivalently, decrease the anticipated sale price at some future date.

In addition, the actor needs to consider the possibility of incurring future costs arising from residual liabilities. If remediation requirements stiffen, for instance, L may remain unchanged in physical terms, but the remediation requirement at time t=t2 could increase because of new evidence that a pollutant concentration previously thought to be safe is inadequate. R also could increase at t=t2 if the limits imposed on future land uses fail (a probability that rises with the level of L) and sensitive receptors are exposed to the residual contamination. Those costs may exceed the funds for remediation if the exposures result in bodily injury claims from workers, residents, or neighbors.

The higher the likelihood of either of these outcomes, and the more risk averse the actor is, the more likely the actor may be to undertake a lower cost, less sustainable redevelopment C with a short payback period of t≤ t1. With an acceptable return on investment at t=t1, it can be financially rational to terminate ownership in the project in order to avoid the possible costs of increased remediation requirements

arising at t=t2. By terminating ownership, the actor could miss out on the upside of a possible reduction in residual liability at t=t2 (for example, if natural attenuation is found to reduce L, use restrictions are lifted, and a more profitable land use U is permitted), but such prospective gains would be only marginal unless the original investment had already paid off. To fully capture the benefits of a higher allowable U at t=t2, the site owner would need to redevelop the site yet again or sell it to someone willing to do so. This possibility thus still would encourage an initial investment at t=0 that had a short enough payback period to have been profitable over the period from t=0 to t=t2. The uncertainty thus may be creating an incentive for less sustainable short-term-oriented investments.

Two additional factors shape the decision calculus, both of which center on the actor's ability to control the cost of residual liability L. First, if the actor receives full protection from the regulator to bound remediation costs at the completion of the remediation at t=0, regardless of what happens to L, then the pressure for a short investment horizon to avoid possible future remediation requirements at t=t2 is reduced. The state may provide only partial protection, however, and may not provide any protection from 3rd party liability claims (suits for damages associated with bodily injury and/or property damage).

Second, the actor's decision regarding a payback period also will depend on the ability to avoid additional R by terminating an ownership interest in the site. Such termination may legally eliminate liability for that actor, or it may do so effectively even if legal liabilities remain. In the US, for example, a regulator or 3rd party that is legally able to pursue a developer after that party has terminated an ownership interest may have little to recover, if the developer was organized as a limited liability corporation. That legal entity may be terminated long before environmental claims could arise, specifically to make it difficult creditors such as these to collect. The company legal structure may serve to limit its effective longer term liability, thus encouraging shorter-term investments[5]. The potential for a British redeveloper or other party responsible for residual on-site pollution problems to be eligible for a hardship exemption from financial responsibility provides similar protections from prospective costs, with the same incentives towards taking a shorter time horizon in investment decisions.

Decisions of Public Actors

Considering first the governmental environmental effort, Ge, regulators must address the interplay between the costs of enforcement, supported by a limited budget, and its benefits in the form of enhanced social welfare through environmental quality improvements. The obvious problem is how to encourage remediation once the regulator exhausts the enforcement budget. The response is to continue environmental improvements by encouraging private actors to undertake redevelopment projects that will yield both public and private gains, yet R is a cost in the profit maximization function, Π. Allowing higher residual liabilities, L, can reduces R, but at the cost of W and, as argued above, less sustainable practices by private actors, a further loss in W to the extent that the community values sustainability. In addition, by allowing a redevelopment to proceed with a residual environmental liability, the regulator may pass to the next generation a more constrained set of choices for future use since it leaves to the future both the need to address the liability and the physical presence of a new development, further undermining sustainability.

In the US, regulatory authority for contamination mitigation rests with the individual states rather than vesting at local-level. Correspondingly, states take on the remediation role (Ge), determining remediation requirements at t=0 and t=t2 and

5 However, the legal terrain on this is not completely stable, and courts may allow greater access to parent company assets if threats to public health from L are great, a possibility that the actor may need to consider in contemplating the feasibility of escaping L permanently.

shaping the purchase price of land, sales price of the developed project, construction cost, profit, residual liability, land use, and social welfare of local communities. However, while the state government's local footprint is large, the factors that drive the state's behavior relate not to the improvement of local economies but to W, the social welfare function (which for the environmental agency represents predominantly public health and environment features) and the cost of enforcement, a.[6] Other considerations related to local sustainability, most particularly to its economic and social pillars, play smaller roles in the environmental regulator's decision making.

The second part of decision making by public actors relates to the government's role as a promoter of development, Gd. In the US, municipalities have a strong incentive to encourage growth since they can capture many of its benefits by generating local revenue flows from economic development. They thus both shape market conditions at a site under consideration for regeneration and are shaped by these considerations (i.e., M appears in the Gd and Gd appears in M). Such market factors are not the only considerations entering into Gd since various welfare objectives appear indirectly in that function, but they may have an elevated presence. Neighborhoods may be adversely affected, since the potential costs of leaving L on site may be highly localized, while the potential gains from a redevelopment that might have been constrained by higher R, including new local tax revenues in the US case, generate benefits that are felt across the municipality and its residents.

These considerations, particularly the ability to capture economic gains from site redevelopment, may encourage US local governments responsible for site development permitting to favor projects at t=0 that provide faster revenue streams (particularly true for governments that have high social discount rates). Leaving residual liabilities on site may be one way for a private actor to speed project development. Two forces apply pressure against quick permitting, however. First, residual contamination that remains at a site may depress the highest and best use of the site from the perspective of public revenues and, more generally, from the vantage of longer-term social and environmental aspects of sustainability. Second, the local government has a supra-authority, the state regulator, that can second guess local decisions and bring an enforcement action at t= t2 that decreases or even terminates the revenue stream and re-stigmatizes the site.

Public environmental and economic development actors in the UK face similar issues in their decisions, although with some important differences. As noted earlier, the UK does not separate environmental oversight and redevelopment concerns at a site since a local planning authority has the responsibility for both at the overwhelming majority of contaminated sites. [7]To be sure, different local authority officers may bear distinct responsibilities, but in principle there can be a stronger integration of consideration for the economic, social, and environmental components of regeneration since all of these fit within the mission of a single local authority. This may promote a more effective integration between remediation needs, construction technologies, and land use decisions. The local planning authority still must address the tensions between providing environmental protection and keeping remediation costs low enough to encourage in-

6 Our formulation ignores the role of state-level economic development entities that may spend hundreds of millions of dollars to promote local economic development. These are separate from environmental agencies and both typically are executive departments that report to the governor. We argue that their unique role at a site-specific level is limited since they serve mostly as the funders of locally-provided incentives to private investors. Thus, we represent them implicitly in the local Gd function rather than explicitly as a separate actor.

7 The Environment Agency does have an important role to play as a NGO in environmental control at t=0, however. Even were all interests in a local authority in agreement on allowing a development to proceed with minimal remediation, the Environment Agency's control of soil guideline values and environmental standards regionally and locally would make it difficult for the local planning officers to ignore those targets. This influence, however, is wielded at t=0, and is less likely to disrupt ongoing land uses and activities in the future than is the external power of the individual states in the US vis-à-vis the localities over which they have power

vestment by allowing residual liabilities at t=0, but it can address this under one institutional umbrella and without the looming presence of enforcement action by a supra-local authority at t=t2 that affects decisions in the US.

Second, local authorities in the UK cannot capture a large share of the immediate public economic gains from the regeneration through taxation. One perverse incentive for quick approval of short-term projects is thereby mitigated. Instead, the local planning authorities depend more on support from the national level. In principle, this reliance could promote a greater willingness to adhere to national-level policy objectives related to sustainable brownfield regeneration. In practice, one of these objectives—the national push to locate 60% of new housing on previously used land—may furnish a similar incentive, serving to lower R and undermine sustainability in the process.

Beyond the Model: Prospects for Sustainable Regeneration

The model we have constructed implicitly presumes that key information is, or can be, known to decision makers. Reality is more complex, as a variety of factors combine to generate uncontrollable risks. Uncertainty about the probability of different outcomes arising – and potentially distorted perceptions of those likelihoods – further compounds decision-making problems.

Some of these factors are structural or systemic, deriving from the nature of the public sector in the US and UK, and the laws and regulations in place. Others are more cultural or sociological in nature, involving belief systems, group processes, and informal historical practices that generate on-going problems. Both types of factors affect the potential for the implementation of regeneration programs that are genuinely more sustainable than past urban development investments. We examine the two sets of factors in order, and then turn to some general conclusions about the differing prospects for sustainable outcomes of current efforts to reuse previously developed urban land.

Structural and Systemic Factors

The more complex the public sector organization and the division of responsibility for decisions and standards for site preparation, the greater the time-to-decision and requirements uncertainty will be for private sector decision-makers. Complexity thus may discourage private investment in regeneration and lead to lower aggregate levels of site reuse, with attendant decline in sustainable new developments.

Organizational complexity in decisions will have a variety of other impacts, including:

- Undermining the capacity to maintain land records that adequately track site characteristics, including known prior uses and residual contamination left on site. In the US, the state environmental regulator need not share data with local land recorders, and local easements and liens may be recorded in different offices from land titles. Moreover, land uses are rarely tracked, even for the less than 50% of US land that is subject to zoning for permitted uses. In Britain, land use records go back centuries and the organizational co-location of regulatory authority and local land records provides at least the capacity to track contaminants on site and apply limitations on land uses and activities to permitting decisions.
- Weakening incentives for enforcement of regulations and limitations on uses that were agreed. In the US, the environmental regulator (state agency) does not see building permit applications and cannot act on them, while the local government, interested in more intensive land uses to raise its revenues, has little

incentive to look for land use violations other than zoning problems. In the UK, the problem may be more severe, with national funding for local authorities not sensitive to discovery of contamination that requires new expenditures to assure mitigation, and the local authority averse to declaring a problem when it does not have the financial wherewithal to address it.

- Diffusing responsibility for long term stewardship , whatever the site conditions, by making it possible for any one agency to claim that another bears the responsibility and thus avoid having to expend their limited resources on any one site or its problems.

Complexity in the structure of state institutions itself thus can undermine pursuit of sustainability, regardless of the cultural context in which it takes place. Arguably, another structural factor beyond the realm of influence of current decision-makers plays a role: the sheer physical size of the state.

We have already noted the vaster proportional extent of previously developed land in the UK as compared to the US. The limited size of the nation thus generates a far higher level of pressure for infill in the UK. The same pattern is evident across the individual states within the US, with the less densely populated ones less concerned with re-use, independent of their industrial or other economic history and experience of past pollution. Space available for new development may thus be considered a structural factor in pursuit of infill.

What is not clear, however, is the relationship of the size variable to the priority assigned to sustainable urban regeneration. It may be that the complexity that comes with size, undermining sustainability planning as suggested above, may further compound the negative impacts associated with accepting "sprawl." Further, a sufficiently acute shortage of newly developable land may create so much pressure for reuse that mitigation standards may be lowered and short term investments accepted that would not be permitted in a context in which new lands might be developed more sustainably. Additional research is clearly needed, and it may well be necessary to compare a substantial number of national settings to determine how size, development pressures, and bureaucratic complexity interact to influence sustainability.

Cultural and Social Factors

Whatever the institutional structures or spatial pressures that may affect pursuit of sustainable regeneration, the norms, values and expectations of the society in which redevelopment is pursued will shape perceptions and thus the ways in which those systemic constraints act on actual behaviors. Those current social mores and patterns of group and inter-group relations, in turn, derive from historical antecedents as much as formal political and legal structures and the spatial extent of the nation state. We can see these forces at work in a number of different dimensions in the US and UK:

- Century-old patterns of spatial segregation and the co-location of environmentally and other noxious sites with minority populations has resulted in a clear, long-standing link between civil rights concerns and "environmental justice" in the US. This has constrained tendencies to lower mitigation standards in order to attract investment into depressed minority neighborhoods – sometimes to the distress of a subset of local residents who would be willing to trade off environmental benefits for jobs and incomes. In the UK, the growth in minority populations – and thus neighborhoods – is more recent, and any such co-location, which is visible, is more clearly attributable to market pressures driving low income minorities into environmentally suspect housing

rather than to systematic placement of environmental hazards near minorities, which is alleged to be the experience in the US. Any such environmental justice claims will tend to raise mitigation standards, R, for any given level of enforcement effort, Ge, in response to political pressures from minority or impoverished populations – and a concern for longer term stewardship for any contaminants left in situ as needed to protect otherwise vulnerable populations.

- Some localities in the US are rebelling against their long experience with expensive economic development initiatives that have created wealth for businesses and property owners in the "growth machine," but done little for workers or neighborhoods. In some, there is exceptional political pressure to show not merely an economic return, but a socially acceptable distribution of those economic gains – and, in some case, evidence that the new economic activity reflects "smart growth" or more sustainable redevelopment.

- "Local Agenda 21" planning efforts were pursued in localities in the UK to a far greater extent than in the US. This orientation may have played some role in broad acceptance of "the triple bottom line" of environmental, social and economic benefits as the appropriate basis for appraising regenerative efforts, whether or not they were labeled specifically as sustainable. This standard, arguably, should encompass a concern for long-term stewardship that would not be present with the narrower profit-orientation of the local growth machine in the US.

- Absent the concern for the triple bottom line, it would appear that the higher infill pressure in UK compared to US would have been expected to have the effect of generating more flexibility and or lower standards for leaving residual liabilities on sites as part of development efforts.

- Whether or not the tri-part evaluative standard promotes better long term stewardship, however, is an open question. The answer may be influenced in large part by past experience with pollution and its impacts on human health and the environment, as well as the levels of trust in – or historical experience with – the quality of prior land use and condition records and their use in decisions on permitting new construction or development.

Reclamation, Regeneration, and/or Sustainability?

In sum, much of the difference in US and UK attitudes towards the importance of extensive remediation and the adequacy of prior provision made for long-term stewardship can be attributed to the origins of the two nations' current national policies for contaminated land. CERCLA, promulgated in the US in 1980, was the direct result of the experience of discovering people were living on highly contaminated property on which the evidence of past pollution had disappeared from the property records. The concern for record keeping, for stewardship and assuring control over sites with remaining contaminants thus emerged from a crisis, and gained political salience and "legs" in media attention. By contrast, British policy, promulgated in guidance documents and Part II (A) of the Environment Act, was the result of calmer deliberation on the problems of reuse, undertaken in response to the emergence of a broad consensus about the need to reuse urban land in order to retain the ambience of their "green and pleasant land."

Neither genesis is "pure." Neither pattern of concern – the virtual panic of the US nor the bland confidence of the US – is fully defensible or "correct." Both reflect

the cultures and experiences from which they emerge. The best those that wish to promote sustainable reclamation of contaminated sites and regeneration of adversely affected neighborhoods can do is to support development of those incentives that promote desirable public and private responses to the problems of sustainable regeneration within the particular cultural context in which they operate.

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1.4 Brownfield-Recycling in Switzerland: eliminating contaminated sites and re-using derelict land at the same time

Rolf Kettler, Kaarina Schenk

ABSTRACT

In the last 10 years, Swiss economy has seen a radical transition from industrial production to the services sector with a loss of 13% of the work places in industry. In addition the ongoing miniaturisation has reduced the necessary land for industrial production to 50%. As a result there are about 20 million square meters of derelict or under-used industrial land. Most of this land is polluted and therefore represents so called brownfields, originating mainly from chemical and machinery industries, watch production, military use, etc. Many of the brownfields often stay abandoned for more than 10 years even if they are situated in favourable locations. The federal authorities should pursue the following lines of strategy to promote brownfield recycling: - Raise awareness within the authorities for brownfield recycling in order to coordinate and speed up procedures; - Sensitization of all stakeholders involved (information, esp. regarding funding instruments); - Creation of a single point of contact, either as a platform (passive), a contact person (reactive) or as an initiator (active); - Develop incentives through improved legal framework (economic and financial policy, spatial planning policy)

General facts about Switzerland

The population of Switzerland is about 7.3 million habitants, living in an area of 41'000 km^2. Outside the sparsely populated mountainous region, which comprises about 60% of the country's surface, most people live or work in the urban areas of the lowland with a population density of about 400 habitants/km^2.

The country's political structure is federalist, organised and divided into 26 states, called Cantons. These Cantons are very different in terms of surface area and population, as well as economy, industrialisation and scientific background. This federalist structure with small organisational units (some of the Cantons have less than 50'000 habitants) caused during time a somewhat chaotic development of the settlement. This was accentuated through an extremely heterogeneous tax-system (national, regional and communal taxes) with differences between the municipalities of up to a factor of 3. The result is an amalgamation between the villages and small cities to larger urban agglomerations around services or tourism centres. The largest metropolitan area is „Greater Zurich" with about 800'000 habitants. On the other hand we find a slow or even negative growing in cities and urban areas with traditional industries like watch production or machinery industry in the northern and western part of the country.

Swiss population has grown within the last 30 years by 19%, mostly by immigration of foreign workers and their families. In the last ten years the population growth in Switzerland is even among the highest in Europe. This caused a high demand for housing space and traffic links which results in annual construction costs of approximately 24.6 billion Euro and a land consumption of nearly 1 m^2/second.

In Switzerland, land-prices for housing and services properties vary extremely and are strongly dependent on the distance to the centres, the traffic lines (highways, railways, airports) and the work places. Land-prices in the metropolitan areas range from several hundred Euro/m^2 to many thousand Euro/m^2 in the city-centres. In the agglomerations between the cities the prices drop to a some hundred Euro/m^2. Prices for industrial land does not vary that much and is between 75-200 Euro/m^2.

Brownfields in Switzerland

Switzerland was never a country with large industrial areas like the Ruhr-area in Germany or the Midlands in England. The structure of the industry was mostly small scaled with 88% of the enterprises having less than 10 work places and only about 1000 enterprises which have more than 250 work places. Nevertheless Switzerland is hosting some of the leading industrial companies of the world like ABB, Novartis, Alusuisse, Holcim. But, in the last 10-20 years, the Swiss economy has seen a radical transition from industrial production to the services sector. At the same time industrial production itself has seen an extreme change: ongoing miniaturisation of technical products, reduction of production time, relocation of manufacturing processes into cheap producing countries (75% in-house manufacturing in 1960 vs. 70% off-house in 2000). This caused also a dramatic change in the employment structure of the industries (80% „blue-collars" in 1960 vs. 75% „white-collars" in 2000) which reduced as well the need for working space. Over all, only in the last 10 years the need of land for industrial production in the remaining companies was reduced to less than 50% whereas the added value of the production has risen up by 50%. In the 90-ies alone, Switzerland has lost 150'000 industrial work places. Many of the big companies have kept only the headquarters and the research centres in Switzerland. Besides that, Switzerland had a long tradition that energy consuming industries settled in the alpine valleys close to cheap hydropower (aluminium refinery, textile industry, foundries). After the shutdown of these industries, there is no more reason to attract new enterprises. That's the reason why in Switzerland more and more large industrial areas are under-used or derelict. Like in other countries most of these areas suffered from ongoing pollution by industrial processes during nearly a hundred years or more and are therefore mostly heavily polluted. As most of these areas are situated in urban or sub-urban locations we call them „brownfields" according to the definition of the expert network CABERNET of the European Union.

If we look at the urban development in Switzerland in industrial time one can observe a so called „spreading-process" from the city-centres into the green-fields in the peripheries. Before WW II industrial plants were built right in the middle of the towns or were itself the reason for the developing of a town. After WW II the industrial complexes became larger and had to move to the outskirts of the old towns. Living quarters had to be built around the factories for the workers and a whole industry belt has been developed around the towns. In the seventies and eighties the structure of the work places changed towards more technical and intellectual requirements. The so called „white-collars" built their houses around the rural villages where the plots were cheap and the distances for commuters short, the so called „bacon-belts" were born. Industrial plants in the city centres were shut down and the first brownfields were generated. With the radical change in the Swiss economic structure in the nineties, the industries were closed in the inner belt and services complexes were built far-out in the so called „green-field". The commuting distances between the economic centre of the cities and the services areas in the agglomeration became longer, the necessary traffic infrastructure more expensive. The good tax-payers moved to the peripheries and the cities had therefore to face severe financial problems and the herit-

age of veritable „brownfield-belts".

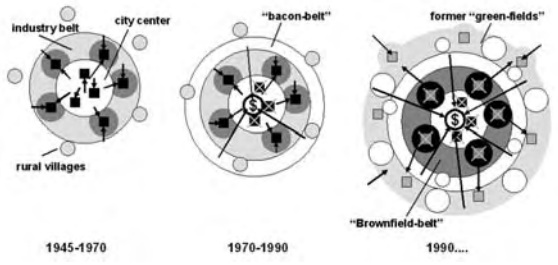

Figure 1 The urban development in Switzerland

The latest survey on the situation of derelict or under-used industrial areas in Switzerland has been carried out in 2003 (Valda 2004). Almost 500 of such areas (incl. railway, military) have been identified. They originate mostly from machinery industries, watch production, textile manufacturing, chemical and pharmaceutical industries, gas works, wood-processing industries, foundries, food industries, military use, etc. The sizes of these areas vary between 10'000-900'000 m2. The total under-used or not-used area is 20 million m2, larger than the surface of Geneva, the second largest city of Switzerland. This represents a potential of housing space for 200'000 people and 15'000 enterprises with 150'000 work places. This would give space for 5 years population growth (basis 1990-2000). The total area of derelict or under-used areas in Switzerland has increased by 39% since 1996.

This derelict or under-used industrial areas would have a value of 1.5-2.3 billion Euro based on average prices for industrial land. But as 60-70% of the areas are closer than 1km to public transport systems and 5km to the next highway exit they could also be transformed to housing or services plots in the near future. This would raise the estimated value of the total land up to about 6.1 million Euro.

As the survey showed, nearly 70% of the areas are already registered in internal or public registers of polluted sites. These areas can therefore be defined as „brownfields". But in Switzerland the registers of polluted sites will be mainly accomplished by 2008, whereas in some of the Cantons the registration will take some years more. Besides the pollution of the soil, many industrial areas have strongly polluted buildings. This means, that the developers have to face with significant costs for contaminated site clean-up and/or waste elimination (excavation, demolition). Only a few owners of brownfields (95) have already carried out site investigations and even less (48) have already remediated their contaminations. Based on this experience the average investigation costs are about 2.7 Euro/m2 with a range of 0.04-23 Euro/m2 and the average clean-up costs are 54 Euro/m2 with an extreme range of 0.27-557 Euro/m2. Based on the whole of the actual Swiss brownfields the overall costs for clean-up of contaminated sites, excavation of polluted soil and elimination of demolition waste is estimated to about 0.77-1.2 billion Euro.

Main target of measures promoting brownfield recycling

What are the instruments to motivate owners of such areas and potential investors as well as the public bodies to recycle brownfield areas? We have to find solutions, that the following equation will reach a significant positive value:

Value of the recycled land – (restoration costs + transformation costs) > 0

This equation can be illustrated by the ABC-Model. Depending on the value of the land and the cost of regeneration (restoration costs + transformation costs), sites can be classified as follows:

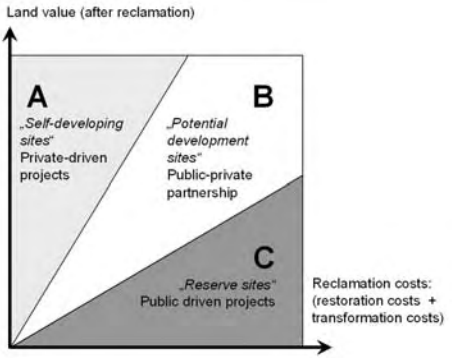

Figure 2 Brownfield Redevelopment Types - the ABC-Model (Cabernet)

- **A Sites**: In Switzerland the land-value for housing and services is, as already mentioned, strongly influenced by its location. For most brownfields in the centre of big cities with a powerful services sector the equation will be far above „0", thus representing type "A" sites. Such development projects are usually driven by private funding. With clear information about the possibilities, a straight handling of official approvals and a defined contaminated sites situation the recycling of brownfields in economic centres should be initiated without other means.

- **B Sites**: For brownfields in former industrial centres the land-prices are mostly low and the equations close to zero or even below. Such recycling projects are characterized as being on the borderline of profitability and investors are difficult to find. B-site projects therefore tend to be funded through public-private co-operation or partnerships. Projects can be improved through the municipality or the regional authorities by providing better traffic access, services or future infrastructure, uprising the utilization value by shifting the spatial zoning from industry to housing or services and/or enabling higher building density or by giving attractive tax conditions to new investors (e.g. tax exemption due to depreciation of real estate)

- **C Sites**: For most of the brownfields in rural areas or far away from congested areas the equation will probably be negative. C-type projects represent mainly public sector or municipality projects driven by public funding or specific legislative instruments (e.g. tax incentives, funding of investigation and restoration by the Swiss government)

- As for comparison, the equation for green-fields will hardly be negative.

The ABC-model shows that public authorities who develop strategies to promote brownfield recycling should put their main effort on B-type sites. At relatively little expense many B-sites can be transformed into A-sites. On the other hand the model also shows that in some situations the reclamation costs are too high for any redevelopment project to become economically interesting. After remediation such brownfields should be transferred from construction zone to agriculture zone.

Redevelopment processes are usually very complex, involving different parties with diverse interests. Such processes require a professional project management. Their complexity also aggravates their promotion. The big challenge is not to find possible measures, but to choose

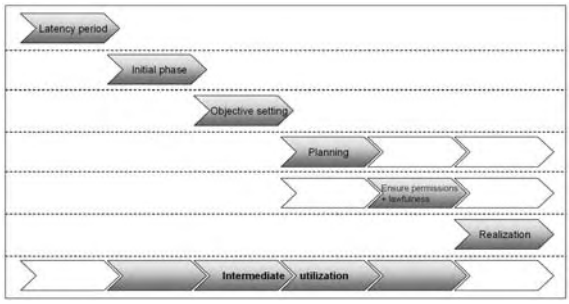

Figure 3: Chronological sequence of brownfield redevelopment projects

the adequate measures to overcome the weak points in the redevelopment process and to implement them at the best point in time. Otherwise promotion measures might hinder or even overthrow ongoing redevelopment projects.

To evaluate suitable promotion measures 10 brownfield sites had been investigated more deeply in Switzerland. Various stakeholders had been interviewed and the chronological and operational structure of the redevelopment processes were analysed.

Chronologically the redevelopment of brownfields can be classified in five phases: latency period (0), initial phase (1), objective setting (2), planning phase (3), ensure permissions + lawfulness (4) realization (5). The 10 case studies revealed that promotion from public authorities is mainly required in the beginning phases. Especially the objective setting phase depends on a clear and reliable general framework. Financial support should be given in terms of a start-up funding.

In a systemic organization model the different steps of a brownfield revitalisation process can be subdivided into four groups: structure, culture, tasks and environment (political, financial, etc.). In each of these groups fields of activity can be defined for the public authorities. According to the evaluated 10 brownfield sites eight such fields should be prioritized in Switzerland.

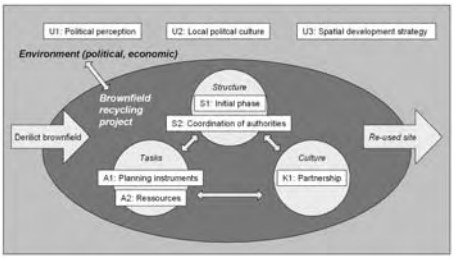

Figure 4: Organization model of brownfield redevelopment projects and main fields of activity for authorities

Next Steps in Switzerland

We conclude from our case-studies that the federal authorities should pursue the following lines of strategy:

- Raise awareness within the public authorities for brownfield recycling in order to coordinate and speed up procedures;
- Sensitization of all stakeholders involved (information, esp. regarding funding instruments);
- Creation of a single point of contact; either as a platform (passive), a contact person (reactive) or as an initiator (active);
- Develop incentives through an improved legal framework (economic and financial policy, spatial planning policy).

In the period until 2011 the Federal Office for the Environment plans to implement four projects. Project 1, 2 and 3 will be part of a "brownfield marketplace", a communication-platform on the internet. Project 4 aims to improve the economic and legal framework of brownfield revitalization. Due to these projects, we expect sensible impulses for new redevelopment processes on brownfields.

Project 1 - Information desk on brownfield recycling: Many of the internationally elaborated recommendations can easily be adapted to redevelopment projects in Switzerland. In project 1 the existing national and international information will be compiled, edited and published on a internet website.

Project 2 - Brownfield register: In project 2 a publicly accessible national register of brownfield sites has to be set up. It should be equipped with a search mask and contain all marketable or potentially marketable brownfields with their relevant site data (e.g. as a "brownfield-passport"). The

register should serve as a connecting door between potentially interested investors and site owners.

Project 3 - Interactive guide to brownfields: Where necessary own measures and recommendations have to be elaborated. They have to be easily implementable. The long-term objective is a checklist covering all relevant aspects (e.g. financial, technical or environmental issues, project management, spatial planning, official processes). The various stakeholders (e.g. site owners, real estate developers, investors, authorities) should be able to adapt the checklist to their specific needs. Another thrust consists in the development of a valuation method to assess and limit the financial risks of building on contaminated brownfields.

Project 4 - Optimization of the economic and legal framework: In project 4 public authorities should be inspired to optimize their processes (lean administration, active co-ordination and shorter time-limits in decision-making processes) and to enact clear legislation and directives. In addition new funding instruments to support and accelerate brownfield recycling have to be evaluated (e.g. non-interest-bearing loans or risk guarantees from the state). Incentives to build on brownfields instead of building on greenfields have to be considered.

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1.5 Fiscal Impact Analysis - Results

Dirk Löhr

ABSTRACT

Generally it is difficult to convince people for sustainable land use policy by ecological arguments. It seems better to point out the economical impacts. Especially in regions with shrinking population the fiscal impacts caused by oversized technical and social infrastructure are immense. The "Zentrum für Bodenschutz und Flächenhaushaltspolitik" (ZBF-UCB) has designed a tool that helps to illustrate the economical consequences of developing new sites according to the criteria of cash flows and net present values. These criteria are also applied in private decision making. The tool can be applied for industrial sites and housing. Up to now it can be used only in the special institutional framework of Rhineland-Palatinate. Thus, an extension is necessary. Such kind of calculation is also required by municipality law. Nevertheless the administration of some municipalities and some mayors worry about more transparency, because it restricts the freedom of making decision.

Introduction

The current consumption of land was about 114 hectare per day in average between 2002 ans 2005 (Statistisches Bundesamt 2006). Nearly half of the consumed land is sealed. The former federal government of Germany proclaimed the target of reaching a land consumption of 30 ha per day until 2020 (Sterr (2005)).

The latter governments adapted this goal, proclaimed by the former environmental minister Angela Merkel.

In several parts of Germany land consumption is increasing despite the population is shrinking. Generally the number of German habitants is assumed to be reduced until 2050 till to the mark of ca. 65 mill. People (Bundestagsdrucksache, S. 30). At the same time, the average age of the population will increase dramatically. Some regions will be concerned seriously, while others will keep on growing (e.g. along the River Rhine).

Remote areas should take into account in their actual planning that especially the costs of technical and social infrastructure have to be paid by fewer and fewer working people. Developing settlement structure without regarding sustainability aspects does not only mean more fixed costs for less payers, but also idle capacity costs.

Such settlement structure makes it also difficult to finance a minimum of infrastructure in remote places. How to provide services at reasonable costs for more and more old, immobile people, living "in the middle of nowhere"?

Last but not least, the ecological impacts of such settlement sprawl have been discussed intensively – I don't have to repeat the arguments.

The land consumption and settlement problem has ecological, economical, social, legal and planning aspects. Furthermore, it is often considered to be an abstract problem.

Nobody feels to be the "born responsible". And, the topic is not politically sexy. Picking up this topic requires politicians to give unwanted messages into the public: Change your behaviour, recognize the sense of restrictions etc.

Most citizens are not susceptive to this kind of messages. On the other hand, one argument always counts even for people, which are not at all committed to environment protection arguments: This argument is money.

Indeed, there is a wide intersection between strategies that are both economically and ecologically responsible.

Hence, the basic idea was to assess public investments (developing new sites) at the same criteria that are "musts" for private investment decision making: Calculating a net present value and highlight the cash flow impacts over the time.

Institutional framework

The legal frame for municipalities (Gemeindeordnung) in German states requires municipals to make economic feasibility studies before investing (e.g. § 10 GemHVO Rhineland-Palatinate, ministerial draft 2005, §§ 7 II, 24, 54 LHO Rhineland-Palatinate). Nevertheless, this law very often is simply not obeyed. Very often municipals are afraid that transparency means better control, and better control means less power.

Nevertheless, some mayors see the problem and want to deal with it actively. But, they don't have a manageable tool to do it yet.

The ZBF-UCB developed such a tool for housing areas and for industrial sites. Before we designed the tool, we collected data in municipals and from other publications (Doetsch et. al. (1997), Dransfeld (2003), Gutsche (2003), Moeckel / Osterhage (2003), Reidenbach et. al. (2005), Heilmann et. al. (2004)).

Up to the present, we could only design a tool do so for the institutional framework of Rhineland-Palatinate. So far it can only be applied for the structure of associations of municipalities (Verbandsgemeinden).

These associations of municipalities drive the administrative overhead for the associated municipalities (Ortsgemeinden). The mayor of the association is doing the job as a professional.

The associated municipalities don't have their own administrative staff. The mayor of the associated municipalities is a volunteer.

This structure has some peculiarities more:

The association of municipalities (Verbandsgemeinde) is responsible for the zoning plan ("Flächennutzungsplan", § 67 Abs. 2 GemO). The associated municipalities (Ortsgemeinden) frame the legally binding development scheme ("Bebauungsplan"). This plan transfers the zoning plan into concrete (§§ 5, 8, 9 BauGB).

The associated municipalities (Ortsgemeinden) normally have a financial incentive to support new sites. The cities hope to generate new tax revenues (real property tax and quota allocation of income tax revenues respectively quota allocation of funds, § 8 LFAG Rhineland-Palatinate).

The association (Verbandsgemeinde) has to bear the consequential costs resulting from these activities (especially the costs of social infrastructure, Moeckel / Osterhage (2003), p. 130-131, § 67 I GemO Rhineland-Palatinate). They have to provide institutions such as schools, fire fighting, hospitals, kindergarten, playgrounds etc. Normally these costs are high and very often can be characterized as fixed costs rising in steps.

These costs, that are initiated from the associated municipalities, have to be paid out of the associations' (Verbandsgemeinde) budget (§ 72 GemO Rhineland-Palatinate). If the costs exceed the financial potentials, the association (Verbandsgemeinde) may charge the associated municipality (Ortsgemeinde). But: Mostly the contribution of the associated municipality (Ortsgemeinde) only covers a certain share of the costs initiated. The association (Verbandsgemeinde) is normally forbidden to charge the full additional costs that are produced: The high administration court (Bundesverwaltungsgericht) gave the restriction that the (associated) municipalities (Ortsgemeinden) should not lose their financial power by such kind of payments (Art. 28 II GG, BVerwG, NVWZ 1985, S. 271). Hence, despite the associated municipalities (Ortsgemeinden) have to pay a certain contribution fee to the association (as well as to the county), the net result of planning and developing new sites normally turns out to be positive for them. The biggest cost blocks are shifted to the associations (Verbandsgemeinden), and this procedure is blessed by the legislation. It is common knowledge in theory of public finance, that allocation deficiencies must be the consequence of such a lack of "fiscal equivalence" (Brümmerhoff 2001, S. 631).

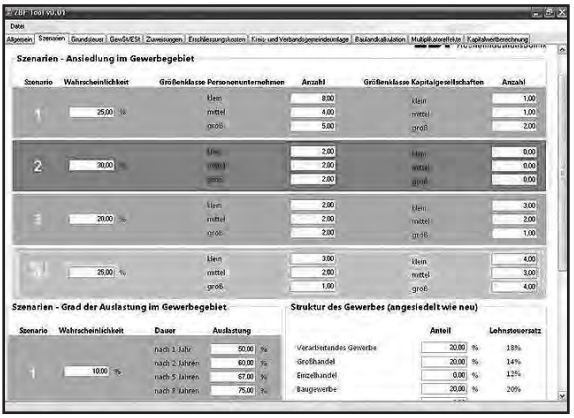

Figure 1:
Screenshot of the calculation tool for industrial sites

Creating the tool

The text below only refers to housing areas. Industrial sites are even more sensitive and complicated to assess. If there is a need for further information in order to assess industrial sites, please contact www.zbf.umwelt-campus.de.

Target of the tool

The tool intends to point out the fiscal consequences for the associated municipal (Ortsgemeinde) as well as for the association (Verbandsgemeinde). The intention is to assess public investments with the same criteria as a private investor does: First, the net present value is calculated, the cash flows over the time are pointed out, and quantitative indications are given for better land use strategies. Also alternative scenarios can be compared with their effects; thus it may also serve for making better management of the fixed costs. Furthermore, the tool may also serve as base for controlling.

Basic principles

Connection between information and responsibility

Information should be addressed to those persons that have the power to control the relevant data. They are the mayor, the city council and the treasurer. In contrast, social costs and benefits should not be assessed, because there is no suiting institutional framework to handle them by the municipalities in a sustainable way.

Setting a suiting framework for avoiding externalities (spillovers) is the task of the federal or state government, not the task of the mayor.

Finally, the tool should not be overwhelmed with informations that cannot be transferred into action.

Cash flows instead of values

Controllers know that "cash is real, values are optional". Hence, we disclaimed for all values (e.g. depreciations as well as shadow costs of land consumption such as impacts on ecology, water etc.). Only one exception is made: The appraisal of the net present value. Despite of that the tool is based only on cash flows.

Differential costs respectively cash flows

Basically marginal costs or revenues (respectively cash inflows and cash outflows) are taken into account, that are caused by the intended project. Especially fixed stepped costs (respectively cash outflows) may have a big volume; hence, using average costs (respectively cash outflows) could easily mislead.

Only such cash flows that have little impact on the result may be introduced into the calculation as average numbers. To see what kind of data matter, we have to insert sensitivity analysis into the tool. We also do not distribute additional overhead costs (respectively cash outflows; that are induced by the planned project). Costs (respectively cash outflows) basically are shown at the administrative units where they appear.

Consolidated figures

Despite there is a lack of fiscal equivalence, we want to show the consequences of the realization of the project in a consolidated figure for the association and that associated municipal, which triggers the development of a new site. Environmental economists know that the polluter and the victim of pollution may reduce external effects and achieve a common optimum if they find to a joint profit maximizing (Varian 2001, pp. 560-563). This consideration may also be extended on adjoining municipals or up to the county level.

Multiplier effects

Also multiplier effects are taken into consideration. They may appear because new citizens increase the local purchase power or because of public infrastructure investments, that emerge follow-up-incomes. The absolute value of the multiplier effect is not very high; it might also be neglected (cp. Reidenbach et. al. 2005, pp. 95-98 and pp. 145-147).

Insecurity and alternative strategies

The tool starts from regional demographic scenarios. They might be very helpful to judge the location and necessity of new sites for housing.

The scenarios also serve for another purpose: Alternative developing strategies might be designed and calculated (cp. Dransfeld 2003). The best way to do has to be taken as a base for follow-up calculations in the tool.

Naturally, making scenarios is an insecure business. Thus, we give subjective probabilities to the financial impacts of the alternative scenarios. In the end, we get an expectation value. This expectation value has to be discounted with a risk adjusted interest rate (otherwise we assume risk neutrality).

Discount rate

The net present value is assessed by discounting the expectation value with a risk adjusted rate. Before doing this, we have to find out a suiting base interest rate (without risk adjustment). At this point we have to think about the relevant opportunity costs: This is the internal rate of return of the best alternative investment. Considering the budget gaps of German municipalities, we decided that generally it might be a good assumption that paying back ones debts the best alternative investment. Hence, the average rate for the municipality's debts is taken as base interest rate

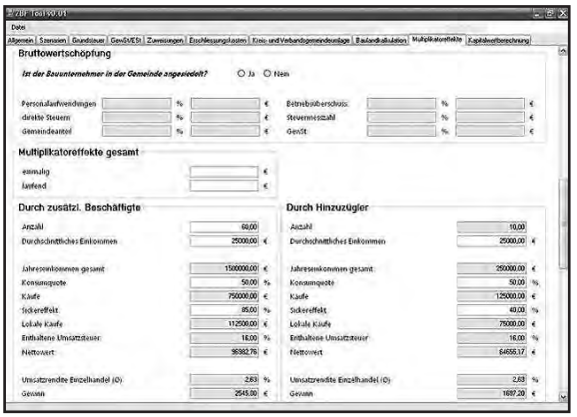

Figure 2: Screenshot of the basic data for the calculation of housing areas

Notes to some important positions

Cash inflows

Normally budgeting is started at the bottleneck (Deyhle 1991, p. 139). Hence, first we figure out the future cash inflows. These data can be derived from the demographic scenarios.

First, the revenues consist of the taxes the municipality gets, if they are generated by additional habitants.

Generating new taxes also has impacts on the finance revenue equalisation scheme (quota allocation of funds, "Schlüsselzuweisungen A and B"). Up to now, we computed this complicated process only suiting to the legal framework of Rhineland-Palatinate.

Only new habitants have positive effects on the fiscal situation. In contrast, habitants moving from one place to another in the same city don't have impacts on the budget. But even for new habitants we have to regard a certain delay between the arrival of the new settlers and the affection of the fiscal situation (real property tax: 2-3 years, for the re-parted share of income taxes 7-8 years, cp. Gutsche 2003, p. 110-111).

Cash outflows

Generally we have to pay attention if we use average costs. They should only be used if there is indication that the effect for the result is small (sensitivity analysis). E.g. even the costs for developing may differ very much, subject to the density of settlement.

As mentioned above, especially the costs for technical and social infrastructure may step up quickly and high. Definitively, these costs should be assessed individually.

Often a flash in the pan has to be taken into account (Geyer 2004, pp. 9-10): In new development areas the incoming families are of the same average age. They also grow old together (Moeckel / Osterhage 2003, p. 130). A lot of the people in the cohort are dying in a relatively short period. Once full of life, the area slowly gets deserted.

Nevertheless, the social and technical infrastructure is normally designed according to the peak demand in the early stages of the settlement. We hope to convince more mayors to use the tool for managing such kind of fixed costs in a more reasonable and farsighted way (e.g. with modular investment strategies, that can be calculated).

Conclusions

The tool described above has to be adapted to the legal framework of other states and other legal forms of municipals (e.g. county boroughs). It can also be used as a base for an integration of new public management techniques: E.g. creating a sustainable balanced scorecard, which is also focussing on land consumption. While introducing an industrial accounting system in the municipalities (double-entry bookkeeping), also the data-supply for managing the tool could be arranged easily.

But, in our pilot project we met a lot of distrust. Parts of the administration staff, some mayors and members of the city council are afraid of the new transparency. They try to defy control, because less control provides more power, less individual risk and higher degrees of freedom.

Certainly, the primacy of politics must be respected. Nevertheless such a tool may help to bring more rationality into the decision process.

Last but not least: We should not stress to much the output aspect of the tool. The input process is at least of the same importance: This is the process of thinking about the data, discussing about how to manage the "value drivers" etc.

Therefore we tried to work on a system that helps municipals to make a "quick shot" without the help of consultants.

Meanwhile, we think differently about this idea. Often (not always) there is a lack of competence and time in the municipals to handle such a complicated tool in a reasonable way. And, we have only limited possibilities to reduce complexity. Hence, it is often very helpful to give assistance and support for the input process (by giving a feeling for the importance of thinking about the data) and the output (result) of the tool.

We are quite sure that calculations such like ours will be evolved into a compulsory part of each bigger municipal investment decision, sooner or later.

For further informations,please have a look on the detailed descriptions in the working papers, published on the institutes´ homepage (cp. Löhr / Fehres 2006).

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1.6 Strategies for Mobilizing Urban Land: Aktionsbündnis Flächen gewinnen in Baden-Württemberg

Stefan Gloger, Bernd Fahle

ABSTRACT

The ministry for the environment of Baden-Württemberg has developed a strategy of „land recovery" to increase the quality of urban planning and the efficiency of land usage. The general orientation is „inner-city development over green-belt development". To attain these aims a broadly-based public relations campaign (Aktionsbündnis Flächen gewinnen in Baden-Württemberg) was initiated in 2004, based on an alliance of the government with local authorities, nature conservation societies and industrial, trade and handicraft key players. The main task for the next years is to develop and review strategies for mobilization urban land and to communicate best practice examples. Planning and realization of inner-city development is both an integrative functional and technical task as well as a management task. This complex procedure of „urban project development" not only needs high quality planning contents but also effective control of processes and a responsible leadership of projects. Occupational image, functions and tasks of urban planners will decisively change in the future.

General conditions and goals for „Recovering Urban Land"

In the State of Baden-Württemberg in south West Germany, ecological and soil protecting development of urban land is becoming very important. Professional and public awareness of sustainable urban development has been increasing significantly. There is a growing coalition in the field of Spatial Planning to reverse the tendency of additional land „consumption" - which is an impediment to sustainable development. The aim is to gain a reduction of land usage especially for housing and commercial development. This will be achieved particularly through exploitation of existing potentials in developed areas as well as through the increased use of inactive or underused urban space. The general orientation is „inner-city development over green-belt development".

This goal corresponds with general social and economic developments which will be influencing urban development in the future. The population will be significantly older on an average and will decrease even in Baden-Württemberg over the next decade. Urban way of life will be more individual and complex. Social life is getting more mobile and - at the same time - will be oriented towards the central areas of towns and cities. Cities, town - communities, and regions will be short on economic resources permanently. Therefore spatial concentration and cooperation will increase. Hence development within existing urban boundaries and urban renewal characterize urban development.

To cope with this future the government of Baden-Württemberg has developed a strategy of „land recovery" based on a large number of research studies and model projects. The most decisive factors in this respect are the quality of urban

planning and the efficiency of land usage. Such a strategy can only be pursued based on the agreement of local authorities and not against their interests. Since decisions about planning and usage always need to take account of the needs of the people and the local authority policies, the best practice to manage finite resources and soil will require a change in public awareness.

Action Group „Land Recovery in Baden-Württemberg"

To attain these aims a broadly-based public relations campaign by the ministry for the environment was initiated in Baden-Württemberg in fall, 2004. The campaign is based on an alliance of the government with local authorities, nature conservation societies and industrial, trade and handicraft key players under the motto „land recovery".

This public relations campaign is aimed primarily at municipal decision makers. It also involves organisations of urban planners and architects, as well as other players in the field of managing urban land. A total of 16 organisations have participated to-date. In addition to the Baden-Württemberg authorities, these include urban, communal, district and regional associations, environmental protection organizations, the union of the Chambers of Industry and Commerce, the Chambers of Crafts, the Chamber of Architects and Town-planners and other Organizations of the Building and Engineering Professions, the co-operative of the Baden-Württemberg building societies and the Deutsche Bahn AG as owner of a significant amount of inactive central city urban land. These bodies hold joint responsibility for the sustainable development of land and settlements and their senior representatives have signed a declaration to this effect. They have announced that they will make concrete contributions to this subject and support the aims in communications with their members and their publications. Some of the core statements of the joint declaration are:

- share responsibility for natural resources
- respect the environment and be economic in its usage of land resources
- use land and soils efficiently as a model for sustainable development
- maintain the quality of life in economic, social, cultural and ecological terms
- make every effort to safeguard the countryside for future generations

For the past two years all members of the action group have participated in a large amount of professional and public conferences and publications, which are summarized in a statement of accounts to be published in spring, 2007. It is agreed that it will be the key task for the next years to develop and review strategies for mobilization urban land and to communicate best practice examples.

Mobilizing urban land through inner-city development

In the towns and cities of Baden-Württemberg future urban development has to be primarily inner-city development. However, a fair amount of especially smaller towns in our country still prefers to develop areas for housing, commerce and industry at the outskirts of settlements. It is conceded that outskirt developments are planned and realized much easier and faster.

But there are many ecological, economic, and social advantages to inner-city developments. To develop inactive or underused sites leads to increased quality of urban functions and patterns and advances social merge, density and plurality. The central areas of towns and cities will be enhanced for a future role in the fields of trade, accommodation, housing, communication and leisure. There are decisive economic advantages with respect to technical and social infrastructure. Last but not least the lost of agricultural land

will be reduced and the function and pattern of the landscape for ecology and recreation will be saved.

Compared with outskirt development inner-city development is much more complex, sensitive and sophisticated with respect to the investigation of conditions, the planning contents, the organization of procedures, and the weighing of interests. Dealing with polluted areas, traffic emissions, and protection of historical buildings, individual interests, concerns, and expectations about the generation of revenues leads to highly intensive coordination and negotiations in terms of planning contents, management, economy and law.

Especially three groups of players are involved in the difficult task of mobilizing urban land: The city government, the private landowners respective land developers and the urban planners. There is a need for open partnership and communication between these groups in which the urban planner not only is responsible for concepts and plans but also has to play the role of mediation interests and solutions.

The role of the planning professions

Planning and realization of inner-city development is both an integrative functional and technical task as well as a management task oriented towards the realization of planning goals. It is a complex procedure of „urban project development" which not only needs high quality planning contents but also effective control of processes and a responsible leadership of projects. This task requires corresponding organizational and strategic competences. The occupational image, the functions and the tasks of urban planners will therefore decisively change in the future.

In the booming years of urban development in the second half of last century urban planning was a governmental „sovereign" task of town and city authorities. With respect to agreed standards of function, ecology and design, urban planning was a forward looking „supplying" spatial developmental activity which always had a corresponding need. In the last 15 years urban planning has mainly been initiated by definite concepts and projects for the development of specific sites and areas. This is especially true for inner-city developments such as inactive brown field sites and underused existing potential in developed areas, e.g. areas formerly used by military and railway or closed industrial sites.

Today the results of urban planning projects are usually results of managing development proposals and negotiation procedures in public - private partnership.

Legal regulation by public law is further on based on the „formal" level of urban land use planning. But the increasing orientation towards definite urban projects needs „informal" coordination, moderation and contracts, in which potentially divergent interests and goals of the city government - usually with different departments - on one side and the private investors and developers on the other are to be negotiated and confirmed.

Three levels of „Urban Project Development"

In order to raise professional and public awareness for the complex activities and instruments in the urban planning profession - in general and with special respect to inner-city developments - the following distinctions are made in the definition of three levels of urban project development:

- the level of planning contents,
- the level of process management and
- the level of project leadership.

In the reality of urban planning and de-

velopment these three levels of activity are usually mixed functionally as well in time. Frequently these activities and tasks on all three levels will be accomplished by one person or planning institution. But increasingly they are assigned to different actors in the team or partners of urban development.

On a basic level of „planning contents" urban planners deal with the elaboration of urban development conceptions, designs and plans. This is what they are traditionally educated and trained for in schools of urban planning. This elaboration includes the main development aspects of functional distribution, traffic, technical infrastructure, ecology and open space, building and design. This also copes with the legal affirmation by public planning law as well as the legal contracts between public and private planning issues.

On the level of „process management" the competence and responsibility for organization, coordination and control of procedures is rather blurred. Sometimes these activities are integrated in the planning job, sometimes professional project controllers are taking over this task. All aspects of quality management in terms of contents, costs, time, responsibilities and communications are included.

„Project leadership" is explicitly defined as a third level. These activities and responsibilities are originally ascribed to those who assign or induce urban planning: City government or private persons and institutions. On this crucial level plausibility and feasibility of projects have to be analyzed, as well strategic support and moderation of players and procedures have to be prepared and realized. Finally an open and creative goal oriented atmosphere for partnership has to be established.

On the one hand, complex urban planning and development suggests assigning specific competences and responsibilities to different members of the development team including partners from the planning profession, the city government and the project developers. On the other hand, it seems justified that urban planners confront themselves to a goal oriented accomplishment of tasks on all three levels. In using the synergies of this integrated activity they should claim competence and responsibility for a comprehensive process of urban planning - thereby continuing the classical role of the „master-builder" of historical times.

1.7 Key findings from CABERNET – Europe's sustainable brownfield regeneration network

Paul Nathanail, Kate Millar, Detlef Grimski, Uwe Ferber

ABSTRACT

CABERNET, Europe's sustainable brownfield regeneration network, tackles the complex issues raised by brown-field regeneration from a multi-stakeholder perspective. CABERNET enhances brownfield site regeneration by sharing experiences from across Europe, and providing new management strategies, innovative tools, and a framework for coordinated research activities. Originally funded by DG Research, CABERNET continues, in a self-funded form, to provide a forum for the interaction of diverse stakeholder groups across Europe and be-yond. CABERNETers represent landowners, municipalities, researchers, developers, regulators, citizen groups, financiers and professional advisors. They meet to discuss and exchange practices, experiences and aspirations relating to brownfields and the wider issues of urban regeneration. CABERNETers have agreed ten position statements on tackling Europe's brownfield problem, developed conceptual models of brownfields, identified tools to encourage good practice and research needs to be addressed in future EC research programmes.

Introduction

This paper summarises the findings of the first 4 years of CABERNET discussions and deliberations. The full details are presented in "Sustainable Brownfield Regeneration" (CABERNET 2007). Cross references to some of the other papers in this book are made to illustrate the cross cutting nature of many aspects of brownfield regeneration.

For those new to brownfields – or trying to explain the issues and possible solutions - the section on conceptual models is a good starting place. For those seeking ideas for new research projects, the research recommendations may stimulate ideas and proposals.

For practitioners, the case studies and list of resources will assist in improving the services we offer to European and worldwide citizens.

Background to Brownfields

Brownfields are sites that have been affected by the former uses of the site and surrounding land; are derelict and underused; may have real or perceived contamination problems; are mainly in developed urban areas; and require intervention to bring them back to beneficial use.

An important component of European land use is the increase in and persistence of brownfield sites and the difficulties in effectively regenerating these sites. Land use changes over the last fifty years have resulted in swift wide scale dereliction in some areas and slow decline elsewhere. Overall these changes have left Europe with a significant legacy of brownfield sites. During this time of land use change, rather than addressing the problem, numerous cases of poor land management practices have led to urban decay, deprivation and social conflict. Tackling the roots of the pan-European problem that relate to unsustainable land management, manifest in persistent brownfields requires concerted action at the local, national and EU level.

Brownfield land is both a lost opportunity and a problem. Brownfields can have a negative impact on the surrounding area and community, and hinder effective neighbourhood regeneration. Regenerating brownfields can stimulate opportunities at numerous levels to improve urban quality of life, enhancing urban competitiveness, and reduce urban sprawl. Finding solutions for brownfield sites is an increasingly important part of the search for effective policies that are aimed at ensuring a sustainable future for land, and cities in particular. The brownfield agenda is therefore an essential component of the work taking forward the "Sustainable Urban Development in the European Union" and the 6th, and now 7th, Environmental Action programmes of the European Community.

The CABERNET Approach

Regenerating brownfields is a significant challenge due to the complexity of the problem. Sophisticated multifaceted approaches are required to tackle this pan-European – and increasingly global - problem. Some of the key aspects of the brownfield problem relate to the diversity of stakeholders involved in the process. Solutions for brownfields need to focus on multi-stakeholder approaches that respect the range of perspectives as well as the diversity of stakeholder values.

CABERNET

CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) is the European network that is tackling the complex issues that are raised by brownfield regeneration from a multi-stakeholder perspective.

CABERNET's aims are to enhance the regeneration of brownfield sites by sharing experiences from across Europe, and providing new management strategies, innovative tools, and a framework for coordinated research activities. The Network, which was funded by DG Research, was established in 2002 and supported by the EC through to June 2005. Due to the ongoing need for multi-stakeholder dialogue it now continues in a self-funded form.

CABERNET has provided one of the few fora for the interaction of diverse Stakeholder Groups at a European level. CABERNETers consist of stakeholders from groups such as landowners, municipalities, researchers, developers, national regulators, representatives of community groups, consultants and professional advisors. These groups meet to discuss and exchange practices, experiences and aspirations relating to brownfields and the wider issues of urban regeneration. The Network has successfully found and exchanged practical sustainable solutions to both strategic and site specific urban brownfield problems.

CABERNET Outcomes

CABERNET has focused on strategic approaches, exploring solutions for a number of the key economic, environmental and social issues that impact on brownfield regeneration.

As a result of the Network's activities, CABERNET has agreed a number of positive statements on tackling the brownfield problem in Europe, including:

The Network has developed a series of conceptual models of brownfield and highlighted tools that encourage good practice as well as set out research needs that could be addressed in future EC research programmes. In particular the CABERNET work has produced key recommendations on:

- Priority EU Policy Issues
- Research Recommendations (EU and member states level)
- Training Priorities
- Knowledge Transfer and Stakeholder Dialogue

Table 1: CABERNET Position Statements

No.	Title	CABERNET believes	Commentary
1	Specific Brownfield Dimension in Emerging EC Policy Initiatives	that incorporating a specific brownfield dimension in emerging EC thematic strategies and other policy initiatives would enhance sustainability and therefore enhance European competitiveness.	The regeneration of the growing number of brownfields in Europe is an essential part of improving European global competitiveness in a sustainable way. The role of sectoral, cross-cutting or thematic approaches should be assessed.
2	Effective Public-private Partnerships	effective public-private partnerships, designed to bridge the cost-value gap that often prevents the commercial regeneration of many marginally non-viable brownfield sites, should be exempt from EU competition policy.	The cost-value gap prevents the development and regeneration of many marginally commercially non-viable brownfield sites (B sites) across the European territory. EU competition policy has the unintended effect of restricting the ability of Member States to develop public-private partnerships to facilitate the regeneration of commercially non-viable sites, other than where the private sector partner is an SME, and / or the site is located in an assisted region.
3	Evaluate Role of Dedicated Agencies	it is important to critically evaluate the role of dedicated agencies to understand better their potential impact.	Dedicated regeneration Agencies can potentially offer a range of benefits in delivering sustainable solutions to the brownfields problem. It is vital that these relationships are understood now so that we can further improve attempts to empty the 'brownfield bath' in the future.
4	Emphasise Social and Cultural Objectives	that when regenerating brownfield sites, a set of key social and cultural objectives should be considered.	For brownfield regeneration schemes to fully realise sustainability goals, more attention needs to be paid to achieving social and cultural benefits
5	Local Regeneration Strategies	there is a need for a specific strategic approach to Brownfield regeneration at the local government level if the objective of competitive urban environments is to be achieved.	Municipalities influence the manner and pace at which brownfield land is brought back into use. Municipalities address brownfield land issues as part of their wider strategic responsibilities and objectives, e.g. the achievement of sustainable development leading to competitive cities.
6	Financial Strategies for Commercially Non-viable Sites	that EU and Member State funding is necessary for, and should be used, to return non-viable sites to beneficial use (e.g. permanent or transitional low-intensity activities).	A significant proportion of brownfield land is not commercially viable in the foreseeable future (C sites). Such persistently unused brownfields often have adverse effects on sustainability including the competitiveness of European regions and cities
7	Brownfield Process Manager	there is a need for a new professional to develop and deliver opportunity plans for the sustainable regeneration of brownfield sites and ensure these contribute to the comprehensive regeneration of a wider area by delivering environmental protection, local economic and social benefit.	The type of skills base that is currently needed is represented by a Brownfield Process Manager.
8	Environmental Issues	environmental aspects are not always given a balanced consideration e.g. contamination issues can be over emphasised in brownfield regeneration.	Environmental issues can catalyse brownfield regeneration raising environmental, social and economic benefits when targeted at sustainability in a balanced and integrated approach. However, a simplistic sectorial regulatory approach hinders regeneration.
9	Streamline Decision-making in Regeneration	one of the major obstacles in brownfield redevelopment is the complexity and the multitude of factors that are influencing the decision-making process. Planning and permission procedures result in a time consuming and complex process.	It is essential to streamline this decision-making process in order to make brownfield redevelopment competitive with greenfield development.
10	Citizen Participation	that effective citizen participation in decision-making enhances the sustainability of brownfield regeneration projects	There is a well-developed knowledge base relating to the inclusion of citizen participation in decision-making within brownfield regeneration. However, this is commonly undervalued or misunderstood. Much broader discussion and dissemination of tools and good practice is therefore required

Regenerating Brownfields: An European and Global Issue

Brownfields are sites that:

- have been affected by the former uses of the site and surrounding land
- are derelict or underused
- may have real or perceived contamination problems
- are mainly in developed urban areas
- require intervention to bring them back to beneficial use

CABERNET was funded by the EC to examine land use problems from a multi-stakeholder perspective and as result has set out a number of key recommendations that relate to policy, good practice and research programmes.

Land is a finite resource and Europe is not consistently managing its urban land in a sustainable way. Poor land use hinders sustainable urban regeneration. Facing the potential of the land in terms of its development options it is also a lost opportunity. Brownfields occur widely and are persistent in many European regions. Brownfields are a land use problem caused by the failure of historical land management strategies. Regenerating brownfields is a complex process (Edwards er al. 2005). There are straightforward solutions currently available and others are being, or can be, developed. In order to create successful European cities, brownfield regeneration must be at the heart of local, national and European land use policies and practice

Tackling Brownfields: The CABERNET Multi-Stakeholder Approach

Regenerating brownfields is a more complex process than greenfield development or urban regeneration. The process of regeneration is affected by local, national and European drivers and barriers. The process of regeneration involves numerous stakeholders at various stages of the process. Different stakeholder objectives can affect the generation process in positive or negative ways. A lack of shared understanding amongst stakeholders can affect the regeneration process. A lack of coordination between local, national and European strategies can impede sustainable regeneration. Multi-stakeholder engagement and participation have a role to play in all aspects of the regeneration process. Pan-European multi-stakeholder dialogue can help practitioners deal with local issues by sharing knowledge and defining good practice.

The exchange of national problem solving experience can also inform EU policy initiatives on the urban environment. This helps to create instruments that empower – rather than hinder – Europe's cities in a global market while still maintaining the important aspects of subsidiarity.

The brief for the formation of the Network was driven by four overarching goals: a) better awareness and shared understanding of brownfield issues across stakeholder groups throughout Europe; b) conceptual models for a variety brownfield issues; c) coordinated research and training activities across different sectors and countries; d) the identification of best practice approaches and other tools

CABERNET has produced four main outcomes: (1) Shared good practice knowledge through the provisional Case Studies (2) Conceptual Models (3) Policy and Practice Recommendations (4) Research Recommendations

Defining Brownfields: Scale and Nature

CABERNET has identified aspects of the scale and nature of brownfields which may assist policy makers at regional and national level

Brownfields are a problem throughout Europe: Large areas of urban brownfields

have been identified in the majority of EU countries. There are however only limited national data holdings on the true extent of the problem. While the characteristics of brownfield sites are well documented in most member states, the impact of brownfields on urban systems is still quite poorly understood. A number of trial studies have identified that only a small percentage of brownfield sites (predicted as <25 %) have contamination issues.

A significant proportion of brownfields is not commercially viable in the foreseeable future (C sites). Such persistent brownfields often have adverse effects on the sustainability including the competitiveness of European regions and cities. CABERNET believes that EU and Member State funding is necessary for, and should be used, to return non-viable sites to beneficial use (e.g. permanent or transitional low-intensity activities).

Understanding Brownfields: Conceptual Models

Many stakeholders have highlighted the need for conceptual models for brownfield issues. CABERNETers developed five conceptual models to aid understanding of the brownfield regeneration process. Indeed some are used in other papers in this proceedings (Papers 1.4; 5.6; 7.13).

The Bath Model represents the dynamics of Brownfield creation, longevity and redevelopment.

The A-B-C Model, based on earlier work in CLARINET, characterises the drivers for economic viability of brownfield redevelopment (key financial aspects are the location, e.g. the site value after restoration and the financial efforts to prepare the site for development. It can also be used to show the effect of changes in national policy or economic conditions on the commercial viability of individual tracts of land.

The Football Model highlights different stakeholders' interests and identifies the key drivers for development from various perspectives.

The Land Use Puzzle Model demonstrates the interconnected nature of brownfield distribution, land development and the land use cycle.

The Interaction Matrix Model demonstrates interactions between social, environmental, economic and governance factors in urban systems. It serves as a simple index to a complex system.

Regenerating Brownfields: The Current Agenda

CABERNET has identified a number of barriers and opportunities to improve sustainable brownfield regeneration.

Institutional structures can facilitate or hinder the regeneration process. Effective public-private partnerships, designed to bridge the cost-value gap that often prevents commercial regeneration of many marginally non-viable brownfield sites, can overcome constraints of pre-existing public bodies (Papers 3.1, 3.10, 4.1, 4.2, 4.3, 4.5). A critical evaluation of the role of dedicated agencies is required to get a better understanding of their potential impact. Nevertheless, such partnerships should be exempt from EU competition policy.

Both EU and Member State funding is necessary for, and should be used, to return non-viable sites to beneficial use (e.g. permanent or transitional low-intensity activities).

Environmental improvements can catalyse brownfield regeneration raising environmental, social and economic benefits when targeted at sustainability in a balanced and integrated approach (cf Paper 6.6). A simplistic sectoral regulatory approach, e.g. that on waste, hinders regeneration. Lessons need to be learnt from national experiences when developing European instruments such as the proposed Soil Framework Directive.

There is a need for a specific strategic

approach for brownfield regeneration at the local government level if the objective of competitive urban environments is to be achieved. The impact of corporate social responsibility on corporate real estate management, and in particular on global corporate exit strategies from sites, requires research and knowledge transfer activity.

Streamlined decision-making (cf Paper 1.3) is needed in order to make brownfield regeneration competitive with development on greenfield.

Brownfield Management Skills and Citizen participation

Citizen participation has moved from an aspiration to a legal requirement under the Public Participation Directive. CABERNETers believe that effective citizen participation (CP) in decision-making enhances the sustainability of brownfield regeneration projects (Papers 3.9 & 3.11).

CP plays an important role in ensuring that local people active in the decision-making process adopt, foster and support the regeneration. There is a mature CP knowledge base already, but this is poorly understood among brownfield practitioners in particular. CABERNET therefore recommends that a higher proportion of project development resources should be used in CP processes.

CP has a long way to go before it can be regarded as mainstream practice for brownfield regeneration. Brownfield regeneration must shift from being predominantly a 'site' based endeavour, to an activity that is 'people' based involving processes that engage with all stakeholders.

There are many excellent tools already available to support CP processes. There are also examples of where best practice has featured in brownfield regeneration activity, but these remain relatively uncommon. There is a need for further validation of CP approaches, as well as the refinement of existing tools and development of new models. There still remains a significant need for better dissemination of existing information, practice and tools. Delivering training in CP for relevant practitioners is also needed.

CABERNET Research Recommendations for Brownfields and Urban Land Management

CABERNET has identified a number of key research topics for brownfields and wider urban land management. Key areas identified include: assessing the role of Agencies in brownfield regeneration; assessing and developing Corporate Social Responsibility codes; developing methods to facilitate integrated stakeholder decision-making systems for brownfields; and the development of 4-Dimensional Planning approaches

Conclusions

The added value of multi-stakeholder and multidisciplinary approaches in concerted actions and projects is demonstrated in a number of FP5 projects, such as CABERNET, RESCUE, LUDA (Paper 9.2.1).

The challenge of successful European and global urban land management is both ongoing and growing. As such there is an ongoing need for exchange and cooperation to the mutual benefit of all involved.

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2

Technologies, Tools and Case Studies

2.1 The Use of Innovative Remediation Technologies in Brownfield Redevelopment Projects

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ABSTRACT

Within the REVIT-project, the application of innovative remediation techniques (IRT) in brownfield redevelopment projects had to be examined. Discussing different IRT-definitions with an international team of experts it could be seen, that associated ideas are based on country-specific requests. For the following works, IRT had been defined as a technology between the state-of-science and the state-of-the-art. A common use for IRTs are pilot tests or pilot full scale applications.

In a second step, exemplary brownfield redevelopment projects had been analysed to identify site specific reasons for the application of the chosen remediation technologies. Excavation and disposal for the unsaturated zone and pump and treat for the saturated zone could be identified as standard applications within brownfield redevelopment projects. In rare cases, other techniques have been applied in the unsaturated zone. In the saturated zone, the application of alternative remediation techniques seams to be more common. Nevertheless, based on the IRT definition, no IRT-application could be identified within the examined projects. Reasons for the non-application of IRT at brownfield redevelopment projects might be the number of uncertainties at pilot applications.

Introduction

The clean-up of contaminated land is seen as a significant obstacle to the redevelopment of real property, although a large number of different remediation technologies are available nowadays. Among these are also newly developed technologies, which are often described as innovative remediation technologies (IRT). Considering the special site conditions in the area of brownfield redevelopment, it has to be clarified, which remediation technologies have been applied on brownfield redevelopment sites and whether the remediation techniques can be named innovative. To answer this question, the term innovative remediation technology must be defined. Up to now, no general definition for IRT exists, which makes the use of this term for a wide range of applications possible without giving a useful characterisation of the innovative character. Following several well-established definitions in other fields of technical applications, a definition of IRT has been developed for further use and reviewed by an international group of experts.

Based on an investigation of completed brownfields redevelopment projects, it is shown, which remediation technologies are applied in practice for land redevelopment. The main purpose was to find out the reasons for the choice of certain remediation options and the experiences concerning the practical implementation. For this reason, the city of Stuttgart carried out an inquiry together with the reconsite - TTI GmbH in order to analyze and assess brownfields redevelopment projects.

The results of this study and the definition of innovative were discussed during a REVIT-Workshop, held in January 2007 in Horrheim, Germany.

Innovative Remediation Technologies

Introduction

The term innovative remediation technology is well-established and commonly used although no general binding definition of the term is available. Several national and international experts have been contacted and current publications have been reviewed in order to define the term of IRT for further use.

In colloquial language, the term innovative remediation technology is used for a new remediation technology. Currently an expert committee of the German scientific-technical brownfields association ITVA is discussing the term innovative remediation technology related to its work on in-situ remediation technologies (Koschitzky 2006). It is planned to issue a report that will also contain a chapter of definitions, which will define terms such as innovative, state of the art and acknowledged rules of technology in order to clearly distinguish between conventional standard technologies of long standing and current innovative technologies.

The term innovative remediation technology is also used in the name of a board of experts of the altlastenforum Baden-Württemberg e.V. dealing with remediation technologies. In the introduction to one of its publications it says: "The Board for Innovative Investigation, Remediation and Monitoring Technologies […] has […] undertaken the task of identifying promising innovative technologies […], analysing the possibilities of application and presenting the results of this analysis in the form of up-to-date short status reports. […] Only technologies, which have reached a level of development that can be described as "fit for implementation in the field" will be considered."

Within the framework of the EU funded project EURODEMO, a Canadian definition concerning the issue of innovation was introduced during a workshop in Vilnius, Lithuania on 14 September 2006: "Innovation is the process of transforming knowledge into new products, processes and services which, in turn, generate new economic benefits. For this process to succeed, a complete system must be available that supports the movement of a new idea from initial concept, through research and development to a ready-for market product (Western Economic Diversification Canada, http://www.wd.gc.ca/innovation/)."

Another expert reflected, that it would be possible to paraphrase innovative as state-of-the-art and the decision as to whether a specific technology can be called innovative or not would have to be taken individually in each case. Criteria for the decision could be the number of reference sites, where this technology has been applied and the general acceptance of the authorities. In principle, these criteria are independent from the age (e.g. time since the first application) of the technology in question. A technology developed years ago could still be described as innovative, if it has not been approved by the authorities yet, so that it is actually not available on the market.

However, authorities and investors (paying clients) exhibit a higher need for security – particularly if innovative technologies are employed – in order to minimize risks such as potential failure of the technology or rising costs (irrespective of the cause, which might be site investigation as well as remediation technology).

A different aspect is covered by the definition proposed by another expert, who takes into account the principle of sustainability: In terms of sustainability, innovative technologies are characterised by a reduced consumption of energy and resources and reduced waste production. Sustainable remediation technologies according to the Rio-Declaration are therefore characterised by minimized ecological footprints.

It still has to be determined, whether

even a significant reduction of energy or resource consumption through innovative components as mentioned above would come under the heading of innovative. For instance, it is possible to halve the energy consumption of conventional soil vapor extractions through the use of thermal in-situ methods (Hiester & Schrenk 2005).

Derivation of a Definition

An approach to define IRT in contrast to conventional remediation technologies could be based on the fact, that this term denotes technologies, which have not been considered state-of-the-art for long time. According to the free encyclopaedia WIKIPEDIA, state of the art is „a technical term that describes the technical possibilities at a certain point in time, based on reliable and proven knowledge of science and technology. […] It is the level of development of an up-to-date technology, which allows the practical application of this technology with a sufficient reliability concerning the meeting of defined targets. Nevertheless, at this level sufficient long-term experience is still missing and only experts are familiar with the technology in detail. For this reason, civil engineering standards usually require the meeting of "acknowledged-rules-of-technology" instead of state-of-the-art technology. In the context of patent law, "state-of-the-art" denotes technologies, which are already made available to the public, i.e. which have been published in any form. The most important requirement for obtaining a patent is that an invention is novel, i.e. that it clearly differs from the state-of-the-art. Consequently, "state of the art" is a fundamental term of patent law. In patent specifications, frequently the term "state-of-the-art" or the synonym "prior art" is referred to in order to describe the current level of technology, followed by a description of the innovation."

In Germany, a definition of state-of-the-art technology is also given in the Federal Imission Control Act § 3 (6):

"State-of-the-art in the legal sense is that level of development of up-to-date technologies, which is generally considered as sufficient to ensure the suitability of these technologies for the following goals: limitation of emissions into air and water, guarantee of plant safety and environmentally safe waste disposal and avoidance of any other impact on the environment to achieve a high level of environmental protection. For the determination of state-of-the-art technologies, particularly the criteria shown in the appendix have to be taken into account."

In the appendix to the Federal Immission Control Act the following criteria are listed regarding § 3 Abs. 6: „For determining the state-of-the-art, while considering the cost-benefit relationship of potential techniques and the precautionary principle, the following criteria have to be taken into account (in each case relating to plants of a certain type only):

1. Application of technology minimising waste production.
2. Application of technology using materials with a low risk potential.
3. Promotion of the recycling and reuse of materials used and waste produced with a particular technology.
4. Scientific and technological progress.
5. Type and amount of emissions produced and their impact on the environment.
6. Time needed for the start-up of a new or existing plant; time needed for the implementation of a better technology that is available on the market.
7. Consumption of resources and types of resources used for a particular technology (including water); efficiency of energy use.

8. 8. Necessity to minimize the overall impact of emissions and to avoid or reduce the risks for man and environment as far as possible.

9. Necessity to prevent accidents and to minimize their consequences for man and environment.

10. Information published by the European Commission in connection with (Art. 16 Abs. 2 of the Council Directive 96/61/EC of the 24 September 1996 concerning integrated pollution prevention and control) or published by international organisations.

A definition similar to the one given in the Federal Immission Control Act can be found in the Federal Water Act § 7 "Requirements for the discharge of wastewater".

Based of these findings and discussions, the following definition for an innovative remediation technology was suggested:

An innovative technology for the remediation of soil or groundwater contamination is defined as a technology in the transition phase between the state-of-the-art and acknowledged-rules-of-technology.

Criteria for the classification can be found in the corresponding appendix of the Federal Immission Control Act.

This definition was presented and discussed in January 2007 with experts from GB, Netherlands, Switzerland and Germany during an international REVIT-Workshop. The workshop showed, that it is difficult, in fact almost impossible, to find a common definition due to the individual points of view and the different conditions in the European countries.

Most of the German experts agreed with this definition, but the experts from the other European countries disagreed with this suggestion of the definition, because their understanding of the term state-of-the-art is different. Another fact is, that the terms "state-of-science", "state-of-the-art" and "acknowledged-rules-of-the-art" as criteria for differentiation are not commonly used in other countries.

Common sense in context of a definition was that an innovative technology is between the step of state-of-the-science and the step state-of-the-art, but there is no clear border dividing innovative and non-innovative technologies. A combination of different remediation technologies was described not as an innovative solution, but as an intelligent solution.

The period of time, in which a remediation technology can be defined as innovative, is shown schematically in Figure 1.

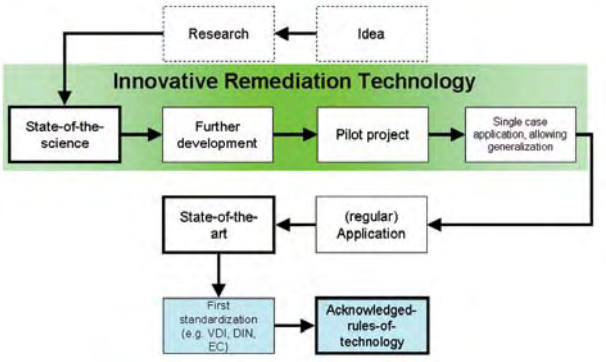

Figure 1: Definition of innovative remediation technology (IRT) in the chain of technological development

The consequence of this definition is that a lot of remediation technologies, which are assessed as innovative technologies, are not really innovative technologies. But it was agreed, that the question whether a technology is innovative or not, plays no role for the choice of a remediation technology. It is more important to choose the best available technique for a site.

Results of the Investigation about Brownfields Redevelopment Projects

Investigation Procedure

The data collection concerning brownfield redevelopment projects was carried out by analyzing publications in scientific journals and conference proceedings and by an online inquiry conducted by the city of Stuttgart. The collection of 35 projects that originated from that inquiry has been analyzed by the reconsite - TTI GmbH in collaboration with the city of Stuttgart. Projects that were interesting with regard to this study were singled out from the collected data. During the investigation, further information about other projects emerged; those projects were also incorporated into the investigation. In total, information from 50 projects has been reviewed.

With the help of schematic record sheets, the projects were characterized in a uniform way. For this, the projects were analyzed by employees of the city of Stuttgart and then transferred on the record sheets. The record sheets of each particular project were sent to the concerned project managers (environmental authorities, engineering consultants, property owners etc.) to clarify remaining questions. The results of this data preparation were examined critically by the reconsite - TTI GmbH. This examination partly resulted in further need of clarification about details. The analysis and the compilation of the study by the reconsite - TTI GmbH was carried out based on the completed record sheets.

Results

Remediation Technologies applied for Brownfields Redevelopment

In total, 50 projects were collected for this study. Of all these projects, 40 were analyzed and the results of these projects were used for the study. Of those 40 projects, 14 projects were analyzed in detail.

The results show that only a few remediation technologies are applied more widely for brownfields remediation. The standard procedure in the unsaturated zone is in most cases excavation & disposal; in the saturated zone it is pump & treat. In some cases, alternative remediation technologies were used. The following Table 1 shows an overview of the technologies that were applied. In general it has to be noted, that in many of the analyzed brownfields redevelopment projects, several different remediation technologies were used at the same site due to the heterogeneity of the contaminants found there. For this reason, the number of remediation applications given is higher than the total number of projects.

In general, technologies for the remediation of the unsaturated zone (soil remediation) and technologies for the remediation of the saturated zone (groundwater remediation) have to be distinguished. Some of the technologies can be used for both zones.

Table 1: Overview of remediation technologies applied in the analyzed projects.

	Technology	Number of appl.
Unsaturated Zone	Dig & Dump	29
	Soil washing	1
	Thermal Ex-situ Treatment	2
	Biological on-site treatment	1
	Biological off-site treatment	6
	Soil vapor extraction	1
	Surface sealing	6
	Containment structures	5
	Containment by sealing with buildings	3
	Immobilization	2
Unsaturated and Saturated Zone	Vertical barrier	1
	Mixed-in-place vertical barrier	1
	Microbiological in-situ methods	2
	Vacuum vapor extraction	1
Saturated Zone	Pump & Treat	7
	Air sparging	1
	Funnel & Gate	2
	Number of applications	**71**
	Number of projects	**40**

Unsaturated Zone (Soil Remediation)

For many of the projects, the remediation of the unsaturated zone was carried out by excavation of the contaminated soil and either on-site containment of the material (containment technology) or disposal or on-site/off-site treatment and subsequent disposal. Excavation and disposal was used for 29 of the 40 projects (about 70 %).

In this context, the term (waste) disposal encompasses the reuse and the destruction of wastes (§ 3 KrW-/AbfG Abs. 7). The material was "reused" e. g. on landfill sites for surface modelling and landfill road construction. In the analyzed projects, manifold reasons were given for choosing the option excavation and disposal:

- For many projects, the demanding deadlines didn't allow for long-term remediation measures, due to the fact that the marketing of real property already had started,
- the low costs for the disposal of contaminated soil, e.g. 12 Euro/t,
- need for a definitely clean site, as the site will be used as residential area in future, resulting in correspondingly high demands concerning environmental standards,
- the excavation area was used for the foundation of buildings and for underground structures, or an excavation was required anyway due to dismantling of buildings on the site,
- clearly defined point sources of contamination or e.g. filled up bomb craters

However, cost-effective disposal (e.g. landfill costs) should be regarded critically, as disposal costs only constitute a part of the total remediation costs. The depth of the contaminant source and the resulting additional expenditure for the excavation (e.g. large volumes needed for slopes, sheeting, special excavation methods (e.g. large hole boring)), the accessibility (e.g. open space or below a building), the surroundings (e.g. industrial area, city center area) and last but not least occupational health and safety issues on the building site and the periphery (e.g. pollutants escaping into air, building noise, truck transports, black/white plant) can be of decisive importance for the total remediation costs of a particular project.

Besides the disposal of excavated, contaminated soil on landfills at some of the analyzed brownfields sites, an off-site soil treatment of the contaminated excavation material was carried out and the material was subsequently disposed of. Soil treatment influences the disposal route (e.g. disposal with or without prior processing); however, the application of technologies on the site itself is usually not affected. Soil washing (ex-situ), thermal treatment (ex-situ) and biological treatment (ex-situ) were employed in the analyzed projects as well.

Containment measures were employed at some of the brownfields projects analyzed. They were applied for the containment of contaminated areas on-site or for landsfills constructed on-site and pits. The containment of contaminants leads to a disruption of the exposure pathways.

On abandoned sites, surface sealing was carried out for instance through sealing by construction. Examples of this are the construction of a parking lot over contaminated zones or the construction of new buildings. The sealing as a consequence of construction leads to a reduction in the amount of leachate. For instance, at one site, the remediation goal was defined as a reduction of infiltration to ≤ 12 %. For several areas on this site, a complete surface sealing was necessary.

Methods for containment by surface sealing were developed first for landfills and meet the acknowledged rules of technology concerning emission protection and preventive groundwater protection. They are well-tried methods that are described

in relevant rules and regulations (LANDFILL ORDINANCE - DEPV, TECHNICAL INSTRUCTIONS ON MUNICIPAL WASTE – TASI). Surface sealing methods can limit the future use of the site. On one of the examined sites, just buildings without a basement and with a surface foundation only are permitted, such as industrial buildings.

Due to the high building costs and the running costs (maintenance of reverse flow gradient), containment techniques constitute an economical alternative only for complex pollution cases and large areas or volumes. Sealed areas can be formed to dams or mounds by piling up contaminated material. Former commercial or industrial areas can take over the function of structuring the scenery due to these landscaping measures

Typically, maintenance has to be considered for all containment measures. This often includes a continuous treatment of the groundwater or the water from the insulated zones

The insulated zones are comparable to landfill structures and can extend into the saturated zone (below groundwater level) as well.

Apart from surface sealing and incapsulation methods, methods for the immobilization of contaminants are of special importance. These were employed on-site in two of the analyzed projects and off-site in one project (treatment plant). Immobilization methods are employed predominantly in the case of contamination with heavy metals (LUA NRW 2005). At the sites, where immobilization was used, treated soil was reintroduced on-site, in parts below roads and noise protection banks. These sites are going to be used as residential areas in future, which argues favourably for the acceptance of these methods.

Saturated Zone (Groundwater Remediation)

All remediation technologies in the saturated zone share the characteristic that they have to be operated over a longer period of time. During the operation time, the remediation facilities or installations (e.g. wells, funnel & gate) usually have to be accessible. For brownfields redevelopment, this characteristic results in the problem that remediation times for hydraulic measures in the saturated zone are difficult to estimate and the site owner is left with financial insecurities.

In the saturated soil zone, the following technologies were employed at the analyzed project sites:

- Pump & treat (P&T): The time needed for remediation with P&T technology is normally several years to decades. For this reason, P&T is often employed for protection instead of remediation of the site. An application with fixed remediation times and goals is only feasible in special cases. P&T can be identified as a standard technique.

- Air sparging technology was employed at a former gas station area during the brownfield remediation of a military site due to geological boundary conditions (depth of contamination in a hard sandstone, low yield of groundwater wells).

- Groundwater circulation wells (GCW)/Vacuum vaporized wells (UVB): A vacuum vaporized well was employed for the pollutant source remediation of a gas station at another military site. Advantages for the application of this technology at that particular site were the low costs in comparison to an excavation of the pollutant source and the improved treatment of the capillary fringe compared to a hydraulic technology (P&T). At the site, the remediation area could not be used for

other purposes during the remediation process of seven years.

- Microbiological remediation methods in the saturated zone were applied in two projects.
- Funnel & gate systems were used at two sites. At one site the criteria for the choice of method were among others the prevention of contaminant transport into a second aquifer.

According to the definition of innovation these technologies are not innovative; they are classified as alternative technologies in relation to the "standard" pump & treat.

Criteria for the Choice of Remediation Technologies

An assessment of the investigated projects with respect to criteria given for the choice of remediation technologies, shows that the remediation costs, the future use, the time required for remediation and the technical reliability of the remediation technology are decisive for the choice of the method applied. In Table 2, the most important criteria are summarized.

Table 2: Criteria for the choice of remediation technologies

Criterion	Number of times mentioned
Technical reliability of the technology	26
Costs	12
Time needed	7

The results of this assessment make it clear, that in general technical and economic criteria are essential for the choice of a remediation technology.

In numerous projects, the option excavation & disposal was investigated as standard method during the planning process. In cases where alternative technologies were preferred, the option excavation & disposal was discarded due to technical and economic reasons, meaning the contamination dimensions or the location of the contaminant led to a disproportionately high technical and economic effort. On those sites, more cost effective remediation technologies or other alternative technologies were employed.

In some cases, the technical feasibility of innovative technologies was decisive for their application, because a successful remediation was technically not possible with the standard methods excavation & disposal or P&T. Examples for this are the use of the funnel & gate method or microbiological remediation techniques.

In addition to technical feasibility, the predicted remediation costs – as shown above – were decisive for the choice of remediation technology. Costs were mentioned as a criterion (as shown in Table 2) by the interviewed persons, without giving numbers for the remediation options considered. The criterion costs was one of the reasons for the use of alternative technologies as well.

The time required for remediation proved to be another important criterion for the choice of remediation technology in some projects. In these projects, the option excavation and disposal or containment measures were employed in the unsaturated zone due to time constraints. In the saturated zone, the use of air sparging can be mentioned as an example. Conventional pump & treat technology would have resulted in a distinctly longer remediation time.

The future use of the site was important for some projects only. On these sites, excavation and disposal was employed; either because the excavated areas were used for building foundations or because the future use as a residential area made it necessary to have a site without rest damage.

Deficits of Data Collection

Basically, the quality of the collected information always depended on the data source and therefore on the position of the interviewed persons (expert, executive company, state authorities planner, geologist, etc.). For some projects:

- no complete information was available, as the projects were completed several years ago,
- the contact persons could answer the questions only from memory, which inevitably led to an impairment of the quality of data,
- information could not be collected entirely, as the contact persons were not allowed to give away information on details due to business discretion.

Conclusions

The analysis shows that the number of soil remediation projects is significantly larger than the number of groundwater remediation projects.

The option excavation & disposal was employed frequently for brownfields redevelopment and constitutes the preferred method for remediation. In more than 70 % of analyzed cases (see Table 1), an excavation of polluted material was used.

One advantage of the method excavation & disposal is the possibility to clean up contamination cases with widely varying contaminant mixtures (e.g. halogenated VOCs, BTEX, fuel contaminants, PAH, heavy metals) in one treatment step with conventional building technology, if required extended by black/white area. Moreover, this method can be used directly for the dismantling of old facilities, such as subsurface tanks. These synergetic effects do usually not occur with all other methods, as they are focused exclusively on the treatment of soil or groundwater. Other methods are mostly conceived for or only efficient with distinct groups of pollutants. The removal of contaminant mixtures is usually not possible with these methods.

In brownfields redevelopment projects, excavation for the removal of contaminant sources can generally be combined with construction work (e.g. underground parking or foundations). If the site investigation is sufficient, these processes can be adjusted already in the planning stage, so that synergetic effects can be used.

For this study, no information could be collected about the status of further developments in the field of off-site remediation methods. It can be assumed that technical developments for off-site remediation technologies are going to influence brownfields redevelopment, if they allow a reduction of costs compared to conventional methods and render alternative disposal methods compared to landfill possible. As many landfills in Germany are going to be shut down, this disposal route, which has been used extensively during the last years, is going to be closed. Corresponding changes in the market segment for the disposal of excavated soil can therefore be expected during the next years.

For the remediation of contaminations in the unsaturated zone, containment by surface sealing, vertical barriers and immobilization methods are employed as alternatives. The first two technologies are well-tried methods developed in the area of landfill construction.

The analysis of the projects shows, that there are no examples of employed IRT for the treatment of the unsaturated zone in brownfield redevelopment projects. The standard technology for the unsaturated zone in these projects is excavation and disposal. All other remediation technologies have to be described as alternative due to the definition of innovative.

This result for the unsaturated zone as demonstrated by the projects was already predicted during discussions with project

managers in engineering consultant companies, environmental authorities and site owners during the search for projects.

In the saturated zone, pump & treat (P&T) is used as a standard technology for groundwater remediation, but a number of alternative remediation technologies were applied in brownfield redevelopment projects as well. Due to the frequently predicted, long operation times for P&T (and as a consequence thereof uncertainties about reaching the remediation goals and keeping to the predicted remediation cost budget), remediation of the saturated zone in brownfields redevelopment projects is often carried out by alternative technologies. Among these can be numbered: passive groundwater remediation methods (funnel & gate), the air sparging method and microbiological remediation technologies.

Requirements for remediation technologies in brownfields redevelopment

In order that alternative remediation technologies (compared to the standards excavation & disposal and pump & treat) can be employed efficiently in brownfields redevelopment, the following requirements concerning the criteria named in Table 2 can be derived:

- alternative technologies have to be cost-efficient, i.e. they have to be at least equal to the standard technologies, or preferably more favourable with respect to costs and efficiency. At accessible remediation sites (unsaturated soil zone without buildings), alternative remediation technologies compete directly with excavation & disposal, with the latter offering the additional possibility of using the excavated areas for subsurface construction (basement, underground parking).

- Using alternative remediation technologies, remediation goals should be reliably obtainable in a certain period of time. The required operation time should be assessable well in order to make the integration of the remediation process into construction plans possible. For brownfields redevelopment projects, normally remediation times in the order of weeks to a few months will be of interest.

- The interfaces between remediation technologies and other construction processes in a brownfields redevelopment project should be controllable in the same way as with the standard techniques.

- Compared with standard remediation technologies, innovative and alternative remediation technologies need usually more time for the final design which might include batch or pilot tests as well. An early start of the remediation, e.g. during deconstruction and independent from the subsequent reuse of a brownfield site would permit a more efficient use of alternative remediation techniques in brownfield redevelopment projcts.

All in all, alternative remediation technologies need to be equal to the standard method technically as well as economically. Another possibility is the way of legislation. In Great Britain, a considerably larger number of different remediation technologies are used, because excavation & disposal is too expensive due to the landfill directive. Additionally, the selection of a remediation technique is based on sustainable criteria. Furthermore, the acceptance of the treatment of contaminated soil is very high. In the Netherlands, alternative remediation technologies are more widely used than in Germany.

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2.2 ThermoAir – an innovative remediation technology to reduce time + costs

Gerd M. Wiedenbeck

ABSTRACT

Time is cash !

When planning remediation services of a contaminated site time often plays a big role. There is no use for a high-tech technology, when it needs a lot of time to plan and to much time till the site is clean enough or it is to expensive. The decision of what is the most suitable remediation method depends on various points.

Sites contaminated with volatile contaminants like CHC or BTEX can be cleaned by using soil vapor extraction systems. With a rise of the the soil temperature the remediation time and finally the costs can be reduced effectivly. The site will be cleaned within a shorter time with a thermal soil vapor extraction technique than using a cold vapor extraction – and it can save a lot of money.

Introduction

Soil vapor extraction (SVE) is a state of the art method to clean soil from volatile contaminats like CHC or BTEX. Since several years engineers developed methods to optimize SVE.

Normally the soil / soil vapor has a temperature between ca. 5°C – 20°C depending on dephts and season / outside temperature. The concentration of the contaminants in the air stream depends amongst others on the temperature of the soil / soil gas. When rising up the temperature of the soil / soilgas the concentration of the contaminants in the air stream will also increase.

Several methods were developed, but most of them work with temperatures of more than 100 °C. To reach such an high energy level a lot of power is needed e.g. a mobile steam power plant or high frequenzy energy. The disadvantages are e.g. that the soil biology will be killed or that a condensation front will be formed that must be additionally cleaned. But the main disadvantage are the high energy costs that make these methods uneconomical.

So the ThermoAir (patent protected) method was born in the year 2000. The ThermoAir method is a low temperature method that avoid most of the problems described above. The only disadvatage is, that it needs a little bit longer time than high temperature systems.

The ThermoAir technology uses the waste heat of the SVE system which is normally ca. 25 °C – 40 °C. The heated air will be brought to an energy level between 50 °C – 70 °C by using a special engine. The hot air will lead in the soil by a metall made soil vapor injection well (see figure 1).

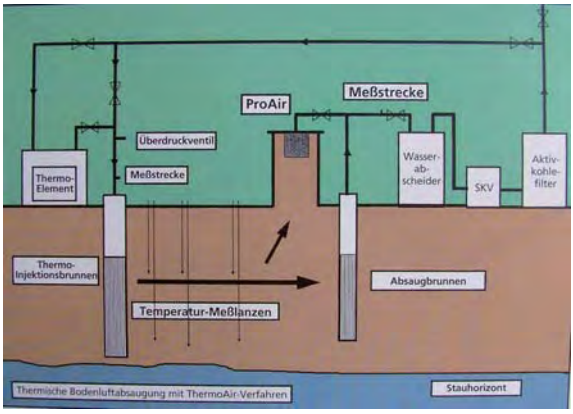

Figure 1: The scheme shows mode of operation

At an extraction well (2" – 4") or ProAir-Extraction System the soilgas will be lead to the vacuum impeller and the cleaning system (active carbon, catalytic afterburner etc.). Normally three introduction wells are around one extraction well.

By and by the soil will be heat up to 100 % . The heating time depends on several facts like kind of soil, soil moisture and permeability and will last normally between two to 4 weeks. The heating process is controled by thermo-lances in several depths and distances. The additional thermal energy has the effect that more contaminants will transfer into the gasphase (up to several 100 % more) and finally they can easily be extracted by the soilgas extraction system. Because of the higher energy level not only light volatile contaminats can be extracted but also some longer-chain hydrocarbons.

The remediation time will be reduced up to 50 % and the area will be ready for civil works. In addition with low costs the ThermoAir technology is a very economically remediation method.

More advantages:

- Soil stays bioactive
- Low invest and operating costs
- No condensation front
- Works also with lower permeability soils
- Sturdy design

Soil vapor extraction tests with ITVA standard will show the technical and economical use of the ThermoAir technology. Such tests are very valuable and highly recommended.

Examples:

1. CHC Spill laundry nearby Frankfurt

At this site a cold soilgas remediation was performed since 8 years. The results showed, that there was a remaining contamination in the silty soil but the cold soil vapor extraction was without further success. With cold extraction technology additional remediation time was estimated with 2 – 3 years.

After installation of a ThermoAir system in 2002 with three injection wells – each 4 meters deep, the concentration in the two extraction wells raised within 4 weeks from 8 mg/m³ to over 2.000 mg/m³ ! Af-

Fig. 2: ThermoAir test field at a CHC spill site nearby Frankfurt (three insulated 2" injection tubes and one extraction well in center)

ter a three week period, the concentration of CHC dropped down to below 10 mg/m³. During that time additional 19 kg CHC have been extracted from the soil.

The additional costs (net):

- 5.500.- Euro for technical equipment + installation + engineering
- 1.500.- Euro rental fee
- 600.- Euro additional energy (0,2Euro /kw)
- Total costs, net : 7.600.- Euro

2. BTEX contamination former french military site near Karlsruhe

At a former military site nearby Karlsruhe a BTEX contamination was detected and has to be remediated. The following use of the area was a business park and time was to short for a "normal" cold soil vapor extraction which was estimated with a total clean up time of 1 ½ years. The geology showed a low pemeable soil (sandy silt).

The area with the highest concentration of BTEX was selected for the ThermoAir technology. Around the 6 meters deep 2" extraction well three 2" injection wells, each 6 meters depth, have been installed and controled by five thermo-lances which showed the temperature in 3 and 5 meter dephts.

The soil temperature increased within three weeks from 12 °C to 22 °C. The range of the heating area reached about five meters. The concentration of BETX increased from 150 mg/m³ to 550 mg/m³. After a six week peroid, the soil was clean enough for the civil works.

Costs (net):

- Drilling of injection + extraction wells: 2.300.- Euro
- Installation of ThermoAir equipment: 2.500.- Euro
- Active carbon : 2.600.- Euro
- Engineering + analyses: 2.100.- Euro
- Rental fee : 2.000.- Euro
- Total energy costs (0,2.-Euro /kw): 2.420.- Euro
- Total costs, net : 13.920.- Euro

Conclusions

With the ThermoAir technology the remediation time of CHC, BTEX and some POL contaminations can be reduced up to 50 % compared with the "normal" - cold soil-gas extraction.

The economical and technical use of the ThermoAir technology will be tested in advance. When the test gives green light for realization it will save you time – and time is cash !

Thank you very much for your interest and patience !

More information you will get at our exhibition booth and on our website www.uc-tec.de . Do not hesitate to ask us.

2.3 VEGAS – Research and Development for the Protection of Soil and Groundwater

Jürgen Braun

ABSTRACT

The "Versuchseinrichtung zur Grundwasser- und Altlastensanierung – VEGAS" (Research Facility for Subsurface Remediation) at the Universität Stuttgart, Stuttgart, Germany, is actively involved in all aspects of brownfield revitalization. In VEGAS fundamental and applied research in the fields of groundwater and aquifer remediation are being conducted. In conjunction with the Institute of Hydraulic Engineering, numerical models are being developed to design field applications and, hence, to transfer the technologies to actual brownfield sites. The physical and numerical work is flanked by the development of advanced site evaluation techniques to enhance the a-priori knowledge of the contaminant distribution and, hence, the potential threat or the potential loss of real estate value. The technologies developed are used to design new management and recycling strategies for brownfields. The researchers of VEGAS are offering a wide range of seminars and continuous education pertaining to the remediation and management of (contaminated) brownfields to ensure that the state of the art is being transferred to regulating agencies and consulting companies. Additionally, various classes are offered to the German and international students of the Universität Stuttgart.

Introduction

In the Federal Republic of Germany, currently 170.000 sites are registered as (partially) contaminated and 70.000 more are suspected to also fit this category. The clean-up costs for these sites are estimated to be well over EURO 100 Billion. Simultaneously, more than 90 ha of agriculturally used land (fields and forests) are being converted daily to residential or industrial areas or are being "used" to build infrastructure such as roads. In order to sustainably manage the resources soil and water, that is to minimize the conversion of "pristine" land, brownfield areas have to be cleaned and reused as residential or industrial areas.

In the 1980s, the potential negative impact of contaminants in the subsurface on the groundwater and on human health was widely recognized. Laboratory investigations, however, did not yield the results necessary to address this question. This was mainly due to the fact that technologies were developed in small experiments (batch and columns). Hence, the effects of aquifer heterogeneity on flow and transport processes but also on reaction, adsorption and degradation were barely understood.

On both the federal and state (Baden-Württemberg) level it was recognized that in order to successfully remediate the subsurface and hence to protect health and properties of the public, the current approach to the remediation of contaminated land needed improvement. As a direct result, the Research Facility for Subsurface Remediation, VEGAS, was established. The VEGAS approach combines the development of remediation technologies with advanced site investigation techniques in order to enhance the sustainable "reuse" of land. The technological approach, however, cannot stand alone.

Hence, VEGAS is also pushing management approaches and is actively conducting technology transfer.

Challenges

Contaminated land not only poses risks to people's health and property, it is also extremely hard to transfer, let alone to sell. Conventional technologies, such as pump and treat, to clean contaminated aquifers often do not yield acceptable cleanup levels in a reasonable time period. Hence, in order to transfer property, the most common approach is to dig-and-dump, that is to dig the contaminant source out, to treat the soil on- or off-site and then to dispose of it. While this method is fast and reliable, often more soil than necessary is being removed and treated due to insufficient on-site chemical analysis. Furthermore, dig and dump very often has a very unfavourable eco-balance, since the moving and shipping of the soil might expose workers and the public to the contaminants and the exhaust of the machinery may cause more negative environmental impact than the initial contaminant source.

Hence, new economically and ecologically acceptable remediation technologies need to be developed in conjunction with the measuring technique necessary to exactly delineate the contaminant source (field screening) and to fast and reliably test samples (on-site chemical analysis). Only if these methods are applied hand in hand with a fast and reliable technology transfer it will be possible to reach a sustainable use of our land.

The VEGAS focus

While VEGAS was initially conceived to bridge the gap between the laboratory and field application, that is to address the technical aspects of aquifer remediation, it was soon recognized that a broader approach was necessary to reach the ultimate goal, to enhance the sustainable use of soil and (ground-)water.

So during its first decade of existence, VEGAS extended its focus of interest to

- Fundamental Research
- Development of Remediation Technologies
- Numerical Modelling
- Measuring and Monitoring Techniques
- Knowledge Transfer
- Brownfield Management

Fundamental Research

The basis of all technology development is fundamental research. Parameters governing the subsurface processes have to be thoroughly understood and governing equations for flow and transport processes on different scales have to be developed. Especially when dealing with non-isothermal multi-fluid / multi-component problems, constitutive relations need to be developed in order to make predictions, to build numerical models and to design technologies (Fig. 1).

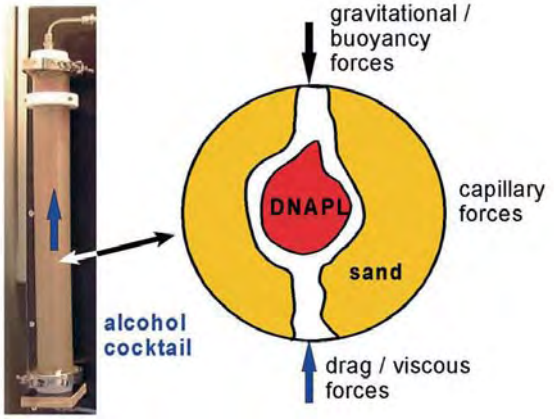

Figure 1: Fundamental Research (Alcohol Flooding)

In order to address these challenges, the traditional (civil) engineering approach needs to be linked with natural sciences such as chemistry and (micro)biology. In interdisciplinary working groups the fundamentals governing the subsurface processes are being examined and the basis for technology development is laid.

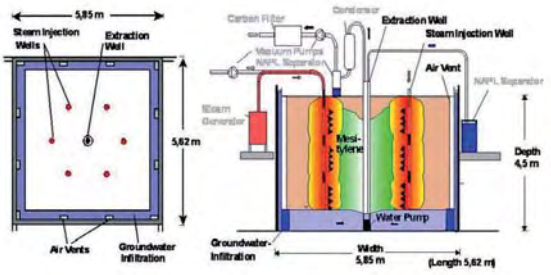

Figure 2: Large Scale Thermal Remediation Experiment

Development of Remediation Technologies

In VEGAS, various German and international researchers work together with industry to develop and test remediation technologies. These technologies may be classified into two sections: Technologies to actively remediate the soil or the contaminant source and technologies to contain the source area and to clean the plume. An example of a very fast and effective method to remove a contaminant source is the injection of thermal energy in the form of steam. For the plume, on the other hand, effectiveness does not require a fast process, rather low energy and low-tech approaches e.g. a siphon reactor are favoured. In the following, these two innovative technologies representing both ends of the VEGAS spectrum are being briefly introduced.

Injection of Thermal Energy

Increasing the temperature of the subsurface reduces interfacial tension, density and viscosity, yielding in a higher mobility of the contaminants. At the same time the vapour pressure is being increased, thus contaminants can be vaporized and removed from the subsurface (Fig. 2).

Depending on the permeability of the subsurface, thermal energy can be applied via the injection of a steam-air-mixture (for high permeability soil such as sand and gravel) or via a heating rod (for low permeability soils such as loam and clay). It has been shown, that both technologies can be applied in both the unsaturated and the saturated zone to efficiently remove a contaminant source.

Siphon Reactor

Very often, plumes have a life expectancy of tens to hundreds of years. Hence, methods geared towards plume remediation or the containment of the source need to be low maintenance and need not use much energy. The siphon reactor makes use of the natural groundwater gradient to pump water from the saturated zone. It basically works like the commonly used pump and treat system, however it does not need electrical energy to drive the pumps. As mentioned before, this is the low-tech end of the VEGAS technologies, and its effectiveness is less than that of pump-and-treat. Nevertheless, the siphon reactor finds its use when both sufficient time and sufficient gradient are available.

While the two technologies introduced can only give a glimpse of the VEGAS activities, they nicely emphasize that a wide range of technologies are required for brownfield redevelopment. For class A sites, that is for prime locations with a high potential resale value, the application of thermal energy may yield the desired cleanup level and expedite the sale of the property. If, on the other hand, the property is rated in category C and cannot be sold within the near future, it is still necessary to protect the neighbour properties while at the same time to make the lot ready for a potential sale.

In summary, remediation technologies need to be developed for a market. The best and most efficient technology will not be sold or applied if it does not meet the time and financial restrictions of a possible buyer.

Development of Numerical Models

Numerical models are an essential part in the transfer of technologies to actual field sites. Hence, in VEGAS there is a long standing symbiosis between experimentalists and modelers. The experiments at various scales yield the constitutive relationships necessary to numerically describe multi-fluid / multi-component flow and transport. The numerical models generate predictions regarding the flow, transport and attenuation processes at various scales. These results can be verified and the model can be validated using the experimental results of the large scale experiments.

At the Institute of Hydraulic Engineering, Chair for Hydromechanics and Modeling of Hydrosystems, the numerical model MUFTE-UG has been extended by various modules to address different aspects of multi-fluid / multi-component flow. These modules are being used extensively to design pilot applications of the new technologies on brownfields. The model's capability to delineate positive and negative influence of various parameters (for example heterogeneity) on a possible clean-up scenario greatly reduces the potential (financial) risk associated with a remediation.

Measuring and Monitoring Technologies

Brownfield development relies on measuring techniques at all stages of recycling and management: In the initial stages, site assessment is necessary to estimate the pollution potential to soil, water and air, and hence, to human health and property (Fig. 3). Unless this potential hazard is contained or at least controlled, a reuse of the area is not possible. Additionally, this screening is the basis for any decision regarding future use of the site and it is indispensable for the design of possible treatment options.

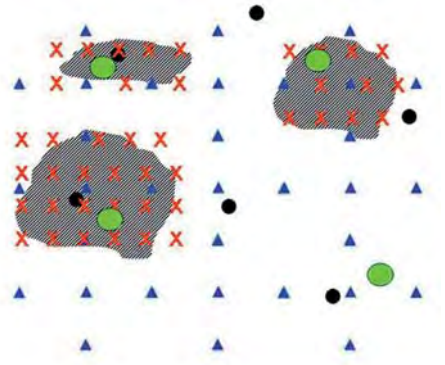

Figure 3:
Enhanced Site Assessment Strategies

Throughout a remediation effort, measurement technologies are necessary to monitor the progress of the remediation in order to make decisions regarding the clean-up levels. During this phase, the technologies need not be 100% accurate with regard to the contaminant concentration. Rather they have to be able to give reliable information whether contaminations are present or not, that is if a measure needs to be continued or may be terminated. The necessary equipment needs to be small (hand-held) and the results need to be available instantaneously.

If a source is not cleaned but rather contained, that is if the actual remediation has been postponed or use is being made of natural attenuation, yet a third kind of measuring technology is necessary. Now long-term numbers are of interest. This means that the technology needs to be simple, reliable and inexpensive. Furthermore it would be desirable that probes are accessible from a remote location (e.g. via a modem).

VEGAS is developing and applying measuring probes for all applications mentioned. Probes are miniaturized in order

to be adapted to e.g. direct push equipment. Other probes are developed to give yes/no readings and hence to quickly delineate a contaminant source area. Especially the combination of the new probes with conventional measuring techniques allow for a reliable and yet relatively inexpensive site assessment.

Knowledge Transfer

Since its conception, VEGAS is organizing seminars, colloquia, etc to enhance the knowledge transfer to consulting companies, federal and local administration, and regulating agencies. The topics offered reflect all areas of VEGAS research and classes range from one to several days. In order to best meet the demand, VEGAS is offering many of these classes in conjunction with state regulatory agencies and / or consulting companies. Additionally, external speakers are invited to increase the width of the continuing education offer.

Brownfield Management

Within a short time after the inauguration of VEGAS it was realized that the approach to involve disciplines of various engineering and natural sciences was not sufficient to recycle derelict land and hence to reach the ultimate goal, the sustainable use of natural resources. Interdisciplinary needed to be used in a much broader sense. It needed to include the knowledge of financial institutes, insurances, lawyers, city planners, etc. As a direct response, VEGAS initiated in the State of Baden-Württemberg the FIGURA research group (Fig. 4).

In FIGURA all stakeholders in the management of brownfields were networked together to conduct case studies in order to delineate problems of the previous, specialized, approach and to point out ways to improve brownfield development.

In order to determine the usefulness of reports, guidelines, etc. on brownfield development, researches in VEGAS collected and evaluated well over 100 papers, guidelines, etc. The outcome was listed in a data bank. The internet portal http://www.flaecheninfo.de/ offers information on various topics pertaining to brownfield management and allows queries in order for the user to quickly find relevant information.

Currently, VEGAS is involved in various REFINA projects. The project "SMC Develop SMS – Small and Medium Sized Companies Develop Small and Medium Size Sites" is interested in urban sites that have a very high potential for development. The project "KOSAR", on the other hand is looking in management options for sites that have virtually no potential for reuse due to their location in areas that have a diminishing population and a unfavourable economy. The two projects are flanked by a third, "WissTrans", that specializes on the knowledge transfer to cities and property owners in order to enhance the reuse of brownfields.

Figure 4: Stakeholders in the FIGURA Network

Figure 5: Web-Portal "flaecheninfo.de"

Conclusions

During the last decade, VEGAS managed to establish a good reputation both nationally and internationally. Of course, a good reputation is a constant challenge and VEGAS is ready to meet this challenge. It will strive to maintain an interdisciplinary contact person for researchers and users alike.

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www.vegasinfo.de

2.4 VEGAS – Technologies for Challenging Soil and Groundwater Contamination Problems

Hans-Peter Koschitzky

ABSTRACT

Many sites in industrialized countries are contaminated with high levels of organic contaminants. These non-aqueous phase liquids (NAPL) are often above and below the water table, acting as long-term sources. Groundwater damages caused by chlorinated hydrocarbons (CHC) are a serious problem, since the CHC sources cause long and persistent plumes. They often cannot be treated with common remediation methods either within acceptable time frames or sustainably. A sustainable decontamination requires a reliable removal of the source zone.

At the VEGAS facility, two thermal in-situ remediation technologies, "steam-air injection" (TUBA) and "thermal wells" (THERIS) have been developed and tested in large-scale experiments and proven in several applications under well controlled and documented conditions. These technologies enable successful and cost-effective remediation within a few weeks or months.

The contribution presents two successful pilot remediations. In one case below a historical building a CHC source is in the saturated as well as the unsaturated zone of a sand/gravel subsurface. The other case is in a highly populated area with a contamination in the unsaturated subsurface of low permeability. The presentation focuses on how these thermally enhanced in-situ remediation technologies can remove CHC from the unsaturated zone and the groundwater body efficiently and economically.

Introduction

Groundwater resources in many parts of the industrialised world are threatened by the presence of non-aqueous phase liquids (NAPL) in the subsurface such as chlorinated hydrocarbons (CHC), polycyclic aromatic hydrocarbons (PAH) like oil tars, and so on. A common and also notorious group of NAPLs are the monoaromatic hydrocarbons such as benzene, toluene, ethylbenzene, and xylene (BTEX). Because of their low densities of around 0.86 g/cm3, BTEX are classified as LNAPL (Light Non-Aqueous Phase Liquid).

Besides these LNAPLs recalcitrant chlororganics such as perchloroethylene (PCE) and trichloroethylene (TCE) are prevalent contaminants of the subsurface. Due to their relatively high densities of about 50 to 60 % higher than that of the ambient groundwater they are called DNAPL (Dense Non-Aqueous Phase Liquid).

If the source of contamination is located in the unsaturated zone, the soil can either be residually saturated with NAPLs or the contaminants can form pools of free phase on top of fine layers and floating layers on top of the groundwater table and the capillary fringe. NAPLs within the saturated zone (groundwater) exist either as discontinuous water-entrapped ganglia or pools of free phase which, in the case of DNAPLs, are situated on top of layers of low permeablity and on the bottom of aquifers (Figure 1). Because the aqueous solubility of both the abovementioned LNAPLs and DNAPLs is typically low, free-phase solvents can act as long-term sources for decades up to centuries (PAH).

Groundwater damages caused by chlorinated hydrocarbons are serious problems, since the CHC cause long and persistent plumes downstream of the source. Conventional in-situ remediation technolo-

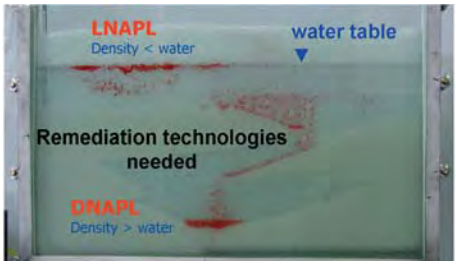

Figure 1: Spill experiment showing behaviour of LNAPL and DNAPL in the subsurface

gies, such as pump-and-treat and also soil-vapour extraction for the unsaturated zone above the groundwater table which also can act as source for the groundwater contamination, have been shown to be of limited value for NAPL recovery from the subsurface as well as not offering a sustainable solution to the problem. So many of these standard in-situ remediation technologies do not fulfill the promised remediation progress either on a time or financial scale (Altenbockum & Odensass 1998).

The reasons are the different physiochemical properties of these organic chemicals, such as low volatility and/or solubility, adsorption into the soil or partition into the soil organic matter (Davis 1997). Pump-and-treat as well as soil-vapour extraction systems recover only the dissolved or gaseous phase which can be extracted from the "permeable regions" of the subsurface. Because this attempt is diffusion-limited, long time periods up to decades may be required for the recovery the majority of the contamination. Therefore the development of innovative in-situ source treatment technologies has been accelerated in recent years for a more effective remediation, especially for DNAPL source zones (Betz 1998, ITRC 2002; U.S.EPA 2003).

However, due to their chemical/physical characteristics – particularly their high density (DNAPL) – CHC sources in groundwater bodies also migrate in soil layers with low permeability (e.g. silt, clay layers) or in the bottom of aquifers. These heterogeneities, primarily characterised by large variations in hydraulic conductivity and/or layers of low permeability, severely limit all kinds of flushing methods such as surfactant flushing, alcohol flooding or chemical oxidation or reduction methods.

Thermal in-situ technologies

A sustainable decontamination requires a reliable removal of the source zone. Due to the soil heterogeneities, this is not feasible for many technologies. As an exception, thermally enhanced remediation technologies can overcome these limits. Heat transport is not limited by soil heterogeneities; this means heat propagation is nearly independent of the permeability. Therefore these technologies have the potential to treat heterogeneous porous media efficiently. Moreover, no chemical agents have to be introduced into the subsurface.

The application of thermally enhanced soil-vapour extraction (TSVE) using steam/steam-air injection or thermal wells for the cleanup of the unsaturated and/or the saturated zone are promising and reliable technologies for enhancing the remediation of source zones (Betz et al. 1998, Schmidt et al. 2000). Following an increase of the temperature in the subsurface, the volatility of organic solvents increases and the interfacial tension is reduced, significantly increasing the extraction rates.

Steam-air injection

TSVE using steam or steam-air injection is applied to enhance soil-vapour extraction to achieve safe and fast remediation of hot-spot areas in the unsaturated and the saturated zone. Steam or steam-air mixtures are injected into the contaminated zones to evaporate organic contaminants by active convective heating of the soil to steam or steam-air temperature. The contaminants are carried by the steam or hot air towards the soil-vapour extraction wells. The extracted soil-vapour is treated by condensation, phase separation and,

depending on the kind of contamination, by biological degradation or sorption on activated carbon.

As shown in Figure 2, the steam or steam-air mixture is injected mostly via vertical wells into the subsurface and is combined with a soil-vapour extraction and a groundwater-controlling system for remediation purposes.

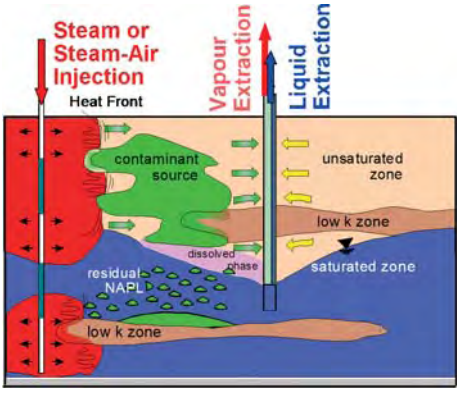

Figure 2: Principles of TSVE for steam/steam-air injection

TSVE can be applied for organic contaminants with boiling points lower than 180°C and aquifers of medium permeability, e.g. sands and silty sands. Based on field application experience, even soil layers of low permeability e.g. clay or till of a few meters, can be successfully remediated. Because of the limited injection pressures in these cases, the advective heating process dominates and a fast remediation within weeks is not possible. In the case of thick layers of low permeability (some meters), the use of thermal wells is necessary.

TSVE using only steam injection can be applied in both saturated and unsaturated zones to remediate the groundwater fluctuation zone from LNAPL contamination. The use of steam without air injection can cause the organic phase to mobilize in front of the steam front. In the case of a LNAPL contamination, the mobilized free organic phase is extracted using a groundwater pumping system and a free phase extraction system.

In the case of a DNAPL contamination the risk of a downward migration due to the accumulation of the organic phase in front of the steam front has to be prevented. Therefore, steam-air injection is urgently required. The injected air functions as an inert gas that carries the evaporated organic phase, the steam serves as the energy-transfer medium. The successful application of steam-air injection has been proven in the laboratory and in a pilot scale application (Schmidt et al. 2000 and 2002).

The technical equipment for TSVE application is based on SVE equipment. Additionally, a steam generator and a compressor are needed to provide the injection medium. The air and the steam are mixed by means of a mixing condenser. All pipes for injection and extraction have to be insulated. The diameter of the steam injection wells (2" – 4") are dependent on the mass of steam to be injected. The temperatures in the field are measured in 2" wells by thermocouples and/or ERT (electric resistance tomography) and additional measurement devices. The wells and pipes should be heat resistant up to 100°C and are made of steel. A condenser is used to recover the main part of the vaporised organic phase from the extracted soil-vapour. An automatically working phase separator is needed downstream of the condenser and the groundwater-phase extraction system. A groundwater controlling and pumping system should be installed depending on the extension and kind of contamination. In this system, a phase pumping system should be integrated.

Results from various experiments and field applications can be found in the state-of-the-art reports of Koschitzky et al. 2003 and Parbs and Birke 2005.

Thermal wells (THERIS)

To overcome the limitations of steam-air injection (low permeability of the subsurface), TSVE using thermal wells (called THERIS) has been developed and proved successfully in large scale experiments with heterogeneous subsurface and also in field applications for the unsaturated zone. It was shown that layers of low permeability and contaminants with moderate to high boiling points can be remediated.

Currently, a research group composed of TerraTherm (a US in-situ thermal remediation company), VEGAS and MK Tech Solutions (US consultant, numerical simulation) are working together on a research project funded by the U.S. Strategic Environmental Research and Development Program (SERDP) to develop and optimize the application of this technology for the saturated zone (Hiester 2005).

Thermal wells contain electrical heating elements operating at 400-700°C and can heat media of both high and low permeability through a combination of thermal conduction and convection. The wells can be operated in multi-well patterns. Central heater-vacuum wells are used to collect vapour for aboveground condensation and/or treatment. Also separate heaters (thermal wells) and conventional extraction steel wells can be used (Figure 3). The off-site remediation equipment for treating the extracted soil gas is comparable to that for steam-air injection.

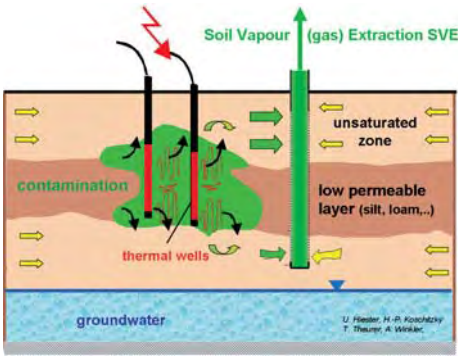

Figure 3: Principles of TSVE applying thermal wells (THERIS)

Figure 4: Situation at the Durlach site

Case studies

Pilot Karlsruhe Durlach: steam-air injection

Site situation

A source of chlorinated hydrocarbons (mainly PCE) under the building of a former dry-cleaner in the unsaturated and saturated zone leads to a long persistant contaminant plume (Trötschler et al. 2005). The groundwater level is in the range of 3 - 3.5 m b.g.s. The groundwater direction varies seasonally between west and southwest. The subsurface consists of replenish-ments down to approx. 1.5 m followed by sandy soil with fine silt layers to approx. 2.5 m (kf < 1 x 10^{-5} m/s), fine silty sand to approx. 4 m (kf ~ 5 x 10^{-5} m/s), fine and medium sand to 7 m (kf ~ 0.8 - 3 x 10^{-4} m/s), medium sand with gravel to 8 m (kf ~ 0.5 - 2 x 10^{-3} m/s) and gravel (kf ~ 3 - 8 x 10^{-3} m/s) down to approx. 10 m.

The source zone in the unsaturated zone could be established by measurements of soil air in recent years. The contamination also reached an area outside the building. In this area approx. down to 1 - 2 m, the pilot injection was placed (southwest corner of the building, see Figure 5).

The vertical expansion of the contamination could be detected by groundwater measurements to approx. 6 - 7 m b.g.s.. The results of the site investigations showed high concentrations of PCE in the soil samples of the unsaturated zone up to 3800 mg/kg soil (1 - 2.5 m b.g.s). In the saturated zone (3 - 4 m b.g.s.), con-

Figure 5: Design of Durlach pilot test field

centrations up to 850 mg/kg, as well as 70 mg/kg (4 - 5 m), and/or 6 mg/kg (5 - 6 m) were found. Concentrations up to 40 - 60 mg/l CHC in the groundwater are a clear indicator of residual NAPL in the near field of the sampling location.

Design and implementation of the pilot

On behalf of the environmental agency of the city of Karlsruhe, the pilot remediation test was carried out by a consultant (D.plan) and VEGAS by means of injection (one injection well) of a saturated steam-air mixture with parallel soil-vapour and groundwater extraction. The pilot was accompanied by the numerical modelling of the steam propagation. The goal was the determination of the steam propagation in the saturated zone, as well as the proof of the applicability and efficiency of the remediation technology on the site.

The pilot took place in different phases (see also Figure 6):

1. (One week groundwater and soil-vapour extraction to achieve stable conditions; resulting PCE extraction: 70 kg

2. One week air-sparging: approx. 20 m³/h air was injected through the injection well; resulting PCE extraction: 33 kg

3. (Four weeks injection of a steam-air mixture (105 - 110°C) with decreasing rates from 200 to 120 kg/h; resulting PCE extraction: 200 kg

4. Six weeks cooling phase: starting with one week of air sparging accompanied by soil-vapour and groundwater extraction; resulting PCE extraction: 135 kg.

At the end of the cooling phase, the subsurface had cooled down to temperatures of about 20°C in the saturated zone and 20 - 40°C in the unsaturated zone.

Results of the pilot and future work

The calculated target radius for the injection of at least 3 m was achieved only within some days with a rate of 200 kg/h (180 kg/h steam and 20 kg/h air) and was kept stable afterwards with an injection of approx. 120 kg/h - 140 kg/h. Total extrac-

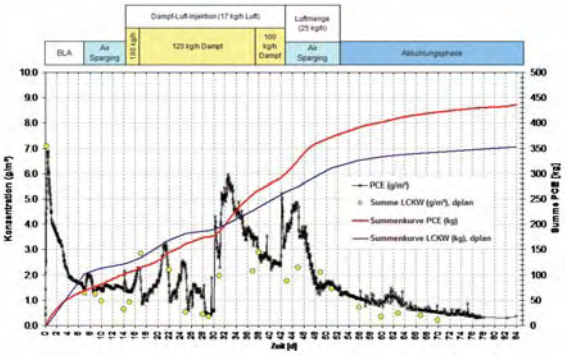

Figure 6: Extraction of contaminant during remediation

tion of more than 440 kg PCE confirmed the efficiency of the steam air injection at the location.

The heat propagation was very fast within the first two days in the permeable gravel layers below 5 m and led to temperatures between 80 and 100°C. Since a propagation of the steam was to be expected outside the pilot field, the steam rate was drastically reduced.

After approximately 20 days, the entire underground in the range between 2 - 7 m was heated with 3 m radius up to temperatures over 90°C and most of the pollutants were evaporised and extracted. In the last two weeks of the steam-air injection, the heat expansion took place easily in the horizontal direction; however as a result of the conductive heating of the silt layers of low permeability in the unsaturated zone, the heating strengthened in vertical direction. The conductive heating during the pilot was always stronger than the theoretically calculated one.

The accompanying numerical simulation for the determination „of the thermal radius" and as a basis for the design of the full remediation (distance of injection wells, determination of the mass flows and the operational parameters) requires a detailed investigation of the underground, in order to be able to provide reliable prognoses. The anisotropy of the layered aquifers plays a crucial role and must additionally be examined.

Based on the results of the pilot, a design for the remediation of the whole site was proposed. The full remediation is expected within the next month.

Field application THERIS

Site situation

A stratified subsurface (top sandy layer, loamy-marly-silty layer, bottom sandy layer) was contaminated with chlorinated hydrocarbons (PCE) in the unsaturated zone. To remediate this site, originally a conventional soil-vapour extraction (SVE) (natural temperatures in the subsurface at about 10°C) was conducted, although the loamy layer has a thickness of several meters. After more than two years of operation, no significant effort to reach the remediation goal was achieved. Due to new investors who want to develop the site, the remediation process had to be accelerated. The surrounding urban area with buildings and infrastructure in the subsurface have not enabled ex-situ alternatives like excavation by ensuring maintainable prices.

THERIS application

The existing SVE system was enhanced by the THERIS method, designed and developed at VEGAS, the Research Facility for Subsurface Remediation at the Universität Stuttgart. Electrically driven heaters (thermal wells) were installed in the layer of low permeability. The complete site installation was finished within two weeks. To check the pneumatic system, the SVE was driven conventionally in a first step for one week. Afterwards, the thermal wells were switched on. The subsurface was heated to enable a fast remediation. A remote monitoring system made it possible to control the heat propagation in the subsurface (Figure 7). The system was also used to verify the heater operation and prevent damage to the existing infrastructure (e.g. earth-laid pipelines crossing the remediation field).

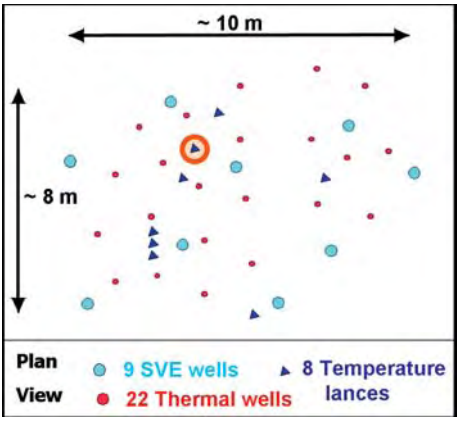

Figure 7: THERIS field site design

Successful THERIS-remediation

The remediation was successfully terminated within 3 months, while heating the target zone to temperature > 90°C (Figure 8). The PCE removal was increased significantly. The reason for the increasing mass extraction is a faster transition from liquid to gaseous phase due to the higher temperature and an increase of the gaseous permeability of the layer of low permeability due to drying effects. The comparison between conventional 'cold' SVE at natural temperatures and the THERIS method showed that the energy consumption of the SVE per mass extraction of PCE was approx. three times higher. The remediation time of the SVE was about 10 times higher. That means that by applying the THERIS method at this site, approx. 2/3 of the energy consumption of the conventional SVE and 90% of the conventional in-situ remediation time could be saved (Koschitzky and Hiester 2005).

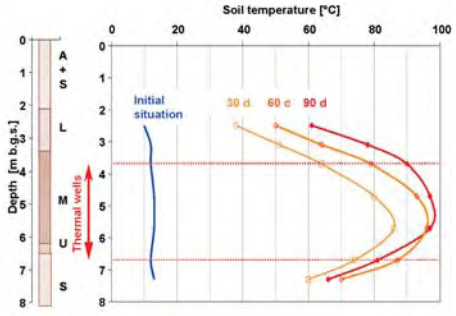

Figure 8: THERIS field site: heat propagation in the layer of low permeability

Conclusions

Several laboratory studies, demonstrations and full-scale projects have shown that in-situ thermal treatment technologies have proven to be effective in-situ remediation technologies for volatile and semi-volatile organic contaminations. These technologies can be used to remediate source zones of LNAPL and DNAPL located under different site conditions. They are especially tapplicable to source zones contaminated with DNAPL in the groundwater and therefore often were used to solve the contamination problem after other conventional remediation technologies such as "cold" soil-vapour extraction or pump-and-treat had been found ineffective or even failed.

In-situ thermal treatment can be used in the unsaturated zone and also in the saturated zone, i.e. also for deep contaminations in aquifers or below buildings or "active" areas, where excavation is not possible.

Moreover, in-situ thermal technologies have the potential for rapid and cost effective remediation, i.e. NAPL removal may be completed within months. Cost analyses showed that energy costs were less than 10% for TSVE. Overall, both methods presented in this contribution are all in all more efficient (ecologically as well as economically) than conventional cold SVE (Hiester and Schrenk 2005).

So these technologies can help solve challenging soil and groundwater contamination problems. Moreover, in connection with the current discussion in Germany of MNA (Monitored Natural Attenuation), which is being considered an option in remediation investigations, source or partial source removal is gaining increasing significance. The aim is to prevent emissions into the plume in order to limit the monitoring time and to accept natural attenuation and temporary groundwater damage.

Acknowledgement

Funding for the R&D projects was provided by the Federal Ministry of Education and Research BMBF, the research program BW-PLUS of the federal state of Baden-Württemberg, Germany, and the European Commission, for the pilot project by the city of Karlsruhe. Thanks to all researchers and staff from VEGAS involved in the various projects, namely Oliver Trötschler and Uwe Hiester.

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2.5 Site Investigation Technologies and Monitoring: R&D Hand in Hand with Industry Part A – The Academic Approach

Norbert Klaas, Katrin Batereau

ABSTRACT

This paper describes the process and the difficulties involved in the development of innovative measurement technologies. This process usually starts with an idea and a first device, which is designed only to fulfil the very needs of a researcher. After a couple of tests and an ongoing change of the components of the device a first prototype might be realized. This prototype can be used by the person who developed the system in research projects. From this state of an instrument to a market ready system many steps in the development process have to follow. These steps are usually far beyond the possibilities of research organisations like universities. Therefore the system has to be transferred to a industry partner. For environmental monitoring techniques the problem arises at this moment, that there is only a small market and for researchers it is difficult to find an industry partner. In this paper a successful example is presented.

Introduction

Although numerical simulations and models have an increasing meaning in environmental decision making, measurements of environmental parameters are the main basis for decisions. And despite of the fact that the importance of the protection of the environment has well been recognised since the 80's and a lot of efforts have been put into the development of appropriate techniques, there is still a considerable demand of improvements and new developments in this field.

The Research Facility for Subsurface Remediation (VEGAS) has accepted this challenge and put a research focus on environmental measurement techniques. In this context several measurement techniques were investigated in order to develop new and improved measurement systems for assessing parameters in the aquifer.

After more than 15 years of such research it turned out, that the main problem in this development process is the step from an "academic device" to an industry compatible product and that this step is neither covered financially by research projects nor is there normally a readiness to assume a risk by the industry. Before a successful example of a development cycle is presented, the research areas of VEGAS are described.

Fields of research in VEGAS

In figure 1 an overview over the different targets and devices is given. The main interests in the past lay on (hydraulic) measurements in ground water observation wells and in the assessment of contaminations at contaminated sites. Lately other fields were identified, where innovative systems could be used and research activities are necessary. In table 1 a summary is given of the specific require-

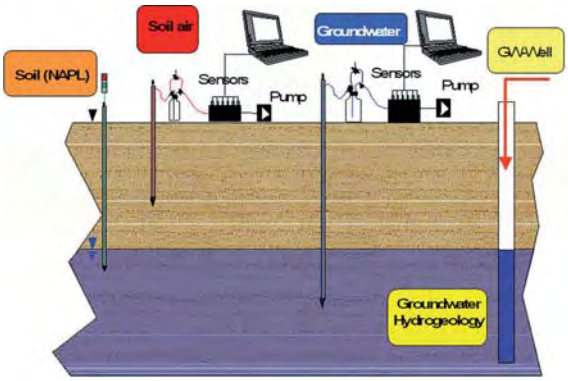


Figure 1:
Research targets for measurement techniques in VEGAS

Task	Requirements
Assessment Step1 (screening) Step 2 (detailed)	magnitude, substances legal limits
Remediation Supporting	fast, robust (towards false negatives)
Long term measurements	stable, reliable (towards changes)

Table 1: Main measurement tasks

ments of different measurement tasks for measurements at contaminated sites.

Assessment of contaminations

The assessment of contaminations is usually done in steps. The first step is a screening investigation. In this step the decision is made, if there is a risk and further actions are necessary. The requirements for the measurements are mainly the reliable detection of contaminated areas, the detection of the kind of contaminants and their order of magnitude. Here, it is better to increase the number of measuring points instead of assessing detailed point information at only few locations.

This means for the measurement systems, that they should provide readily available data (even with low precision) rather than highly accurate measurement in the laboratory at high costs and with a considerable time delay.

In VEGAS a systems for the assessment of contaminations was developed. This system is an array of metal oxide sensors for the detection of volatile organic substances in soil gas. The sensor array can be attached to a driving rod. In this way measurements can be conducted during drilling and depth profiles of soil gas contaminations can be obtained. The system is shown in figure 2.

For the second step, the detailed assessment of a site, an intelligent combination of these innovative systems with laboratory analytics at selected locations could improve the assessment of contaminations.

Figure 2: VEGAS MOX-Sensor

Figure 3: Fast detection of PAH in soil

Measurements during remediation

Another field, where a demand for new techniques exists, are measurements during remediation measures. This means immediate measurements in order to decide on the progress of a remediation as well as the support of the decision on the disposal of excavated material. Both targets require fast and robust measurements.

In VEGAS methods were developed to analyse soil samples directly on-site for PAH, hydrocarbons and volatile halogenated compounds. These methods are based on photometric determinations or make use of a mobile GC-PID. Special extraction and sample cleanup methods had to be developed. Figure 3 shows an example of this method applied during a remediation of a PAH contamination.

Long term measurements

Natural attenuation (NA) as an alternative to active remediation measures is widely discussed. The decision on the application of NA at contaminated areas is usually based on an assessment of a physico-chemical and biological status quo of a site and numerical modelling of the development in the future.

Very little emphasis was put in the past on the monitoring concepts which have to go along with such a decision. A classical sampling and laboratory analysis concept has the disadvantage that the natural dynamics of ground water systems interfere with the need of proofing the stability of a contamination situation. This natural dynamics can be caused by seasonal influences or other factors and is often underestimated.

In this situation the need for measurement systems arises, which enable a (quasi)continuous collection of data. Such systems have to be robust, with long service intervals and with a low energy demand. Such systems have to be optimized for the detection of changes rather than the detection of parameters found in guidelines or legal limits. This allows systems which target at "indirect" parameters, i.e. indicating measurable quantities.

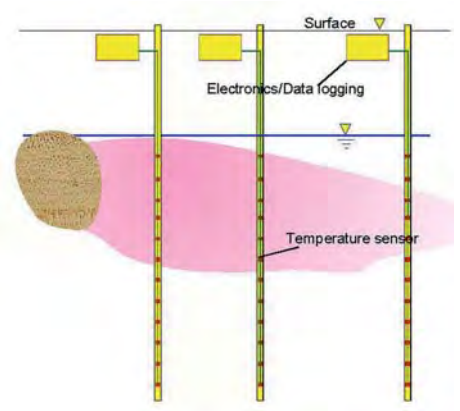


Figure 4: Sketch of temperature measurement in the ground water

For this purpose a system was developed for the exact measurement of temperatures in the ground water. This system can detect changes in the ground water temperature as low as 0.01 Kelvin. At a site which is contaminated mainly with PAH a test field with 96 temperature sensors was set up. Figure 4 gives a sketch of the set-up, figure 5 gives the temperature curves over more than three years for some of the sensors.

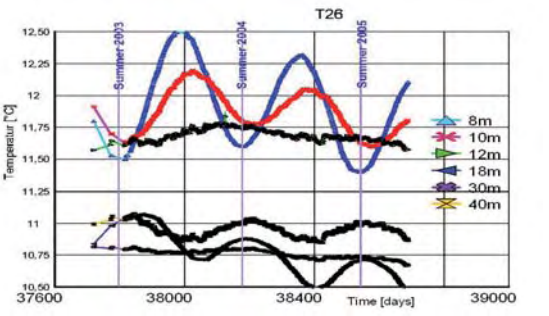
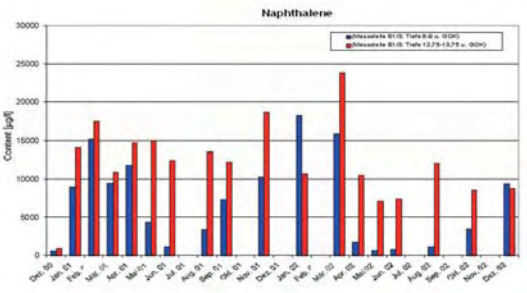


Figure 5: Temperature time series



In accordance with these findings, Naphthalene analyses taken during this time show considerable fluctuations as shown in figure 6.

Figure 6: Naphthalene time series

2.5 Site Investigation Technologies and Monitoring: R&D Hand in Hand with Industry Part B: Thermoflow - an example for the cooperation of research and industry

Nicolaus Rombach, Peter Halla

The history of thermoflow

The history of the thermoflow technique goes back to 1990 when Dr. Barczewski (VEGAS, Universität Stuttgart) used an early version of the equipment to measure vertical groundwater velocities in groundwater observation wells. Seven years later the technique was mentioned in a German guideline on the subject of depth oriented sampling of groundwater published from DVWK (DVWK- Merkblatt 245/1997 Tiefenorientierte Probenahme aus Grundwassermessstellen). The use of thermoflow is recommended for quantification of vertical velocities within a borehole, as the resolution of conventional impeller flowmeters is not high enough to detect small groundwater velocities. 15 years later in July 2005 the University of Stuttgart and BERGHOF Analytik und Umweltengineering agreed on a cooperation. Subject of the ensuing license agreement is the development, production and use of the thermoflow equipment. Steps agreed upon also concern further tests of the equipment within in the framework of project applications. A decision on further investments was postponed until results of further tests were available.

Thermoflow: How does it work

Central part of the measurement instrumentation is a temperature detector and a metal plate. Between the metal plate and the temperature detector there is a temperature contrast. As cold water is moving along the detector heat is extracted, but the temperature gradient between metal plate and detector is kept at a certain value. The energy necessary to keep the temperature constant is a measure for groundwater velocities. The heat sensor and all other instrumentation for the measurements are housed in a cylindrical metal tube. During the logging procedure the sonde is suspended into the borehole from a cable at constant speed. Fig. 7 shows the thermoflow sonde. Some measurement results are shown in Fig. 8.

Figure 7: Thermoflow sonde

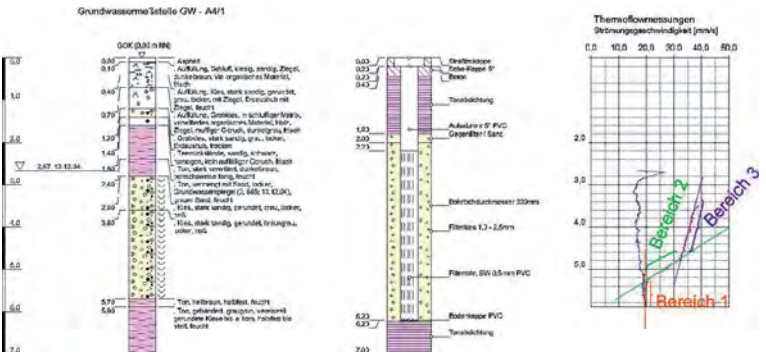


Figure 8: First results obtained

Thermoflow: First use of the prototype

The first measurement campaign with a thermoflow prototype was conducted in December 2004 within the framework of a contaminated site study. The cable winch and the control unit were located in a van (see Fig. 9.). For driving the cable winch an alternating current supply of 220 Volt was necessary. As seen in the photograph the cable winch was quite big (and also very heavy). At sites that could not be reached by the van the equipment had to be moved with a wheel loader (Fig. 10). Also, three persons were necessary to conduct the measurements. Even so handling of the device was obviously inconvenient to start with, the measured velocity profiles met the expectations. Further efforts were made to improve the instrumentation.

Figure 9: The early 220 volt cable winch

Technical changes to meet demands of the industry

Based on the experiences of the early field applications the following objectives for improvement were defined:

1. The system is to be developed so that it can be handled by one person.

2. The handling must be improved so that the method can be applied as part of a standard groundwater sampling procedure or a short-term pumping test.

Figure 10: A field campagne with the first thermoflow prototype

These changes were realized in the meantime. The cable winch is now much smaller and a direct current supply of 12 Volt is sufficient. As a result the cable winch can be carried by one person and is and is now directly fixed on top of the observation well (see Fig. 11). The time necessary to prepare the measurement and the measurement it self is about 2 hours in total for a borehole depth of 2m.

Figure 11:Cable winch with 12 V DC motor

Recent developments and planned activities

Now the system has been tested in different weather conditions (see Fig. 12) in a range of contaminated site studies but also geotechnical engineering projects. For further improvement of the thermoflow sonde it is planned to incorporate sensors to measure electrical conductivity and groundwater temperature.

Figure 12: Measurement campaign in winter

Conclusions

These examples may illustrate the need for further developments in innovative measurement technology for the protection of the environment. In fact, there is put a lot of effort into these developments. The problem remains the gap between academic approaches and the need of the industry. To bridge this gap "innovation partnerships" are necessary. This means, that all involved partners – the developers of systems, the industry as potential vendors, the consultants as potential end users, the authorities and the research funding agencies – have to find ways to shorten the development process of innovative systems.

The developers (researchers) have to consider market needs besides the pure academic goals, the industry has to get involved into the development process in an earlier state to guide the developers, the end users have to put in their specific needs and the funding agencies must be held responsible for products far beyond the early prototype status.

2.6 EURODEMO – Demonstrating Efficient Soil and Groundwater Remediation

Yvonne Spira, John Henstock, Volker Birke, Dietmar Müller

ABSTRACT:

The European Commission recognized a need to strengthen innovation in environmental technologies in order to increase competitiveness of European technologies on a global market and to achieve a more sustainable development in Europe. Process based soil and groundwater remediation technologies are available and have proven applicability and performance on demonstration scales, but market uptake throughout Europe is disappointingly low. The EC funded EURODEMO project is one strategic initiative to promote these technologies and to investigate harmonization of selection, implementation and verification. This article summarizes project results regarding the improvement of the European situation by proposing measures to achieve better market uptake. The results of this Co-ordination Action are suitable to be used within a European Environmental Technologies Verification (ETV) process.

Introduction

Development in the European Union has to balance preserving national identities and diversities against finding common ground for transnational approaches, coordination and collective development. The European Commission has recognized the need to stimulate the development and uptake of environmental technologies in the field of eco-innovations and environmental technologies. This has led to the instigation of the development of the European Commission's Environmental Technologies Action Plan (ETAP) (CEC (2004)). The ETAP is composed of actions around the three main themes of i) Getting from research to market, ii) improving market conditions, and iii) acting globally. Building a central contact point in Europe for innovative soil and groundwater remediation technologies is a crucial step towards reaching these stated goals, which is a reason why the EC-funded project EURODEMO has been launched. EURODEMO is an initiative which will build this contact point for facilitating improved and efficient market uptake of innovative remediation technologies.

Increasingly competitive innovative remediation technologies which can be adopted in the marketplace are a central aim of EURODEMO. To best assist market uptake, EURODEMO focuses on the demonstration scale of technologies, identified as the crucial step in development to reach the market by absorbing, processing, and providing comprehensive information on demonstrations of innovative technologies in the area of soil and groundwater remediation. These themes are addressed and enhanced by several project activities regarding recommendations for "good quality" efficient remediation. Selected results are now described in detail.

Model Protocols for Technical Effectiveness

Remediation is undertaken in order to reduce risks to human health and the environment. For economically viable land remediation, cost and liability considerations often lead to the choice of conventional remediation methods. Innovative and in particular in-situ treatment technologies are usually perceived as being linked to higher uncertainties, therefore they meet market barriers and acceptance problems. The most obvious way to counter these barriers is to provide technical guidance for innovative technology applications. With such guidance, the certainty for successful remediation can effectively be increased.

Consequently, model protocols and guidance for technical reliability of selected technologies have been compiled and condensed regarding the following technologies: i) permeable reactive barriers, ii) in-situ bioremediation, with a focus to anaerobic bioremediation technologies, iii) in-situ thermal remediation technologies, and iv) in-situ chemical remediation, with a focus to chemical oxidation applications (Birke (2007)). Those technologies have been chosen partly for their successful application experience in some European countries, and partly for being considered as having a high potential for Europe-wide successful application. For each of these technologies, the model protocols give guidance for the screening, selection, design, implementation and monitoring phase. Where applicable, the decommissioning phase is also considered. Application of such qualitative preassessment criteria together with quantitative effectiveness guidelines will lead to reasonable technology choices and efficient technology implementation. Finally, successful demonstrations qualify for verification of applied innovative technologies.

Project Reporting Guidelines

A remediation project usually comprises several subsequent stages, starting from risk assessment and ending with site closure. Apart from the technical aspects of remediation processes, also financial, legal and social aspects play a non-negligible role for the implementation of land remediation measures. Therefore, "good quality" remediation projects require very comprehensive considerations. Structuring these manifold aspects of land remediation means to give practitioners a hands-on tool to actually check that relevant issues have been considered, thereby increasing the prospect for remediation success and for positive perception of the remediation.

For these reasons, generic guidelines have been formulated, guiding the practitioner by means of questions through an entire demonstration project (Henstock (2007)). By answering these questions and documenting the reasons for decisions made, a transparent and traceable project documentation evolves. Within these guidelines, also relevant national literature and links are referenced in order to provide "good quality" detailed information sources where needed and available. Such comprehensive and process supporting project documentation not only enables organizations to hold specific project experience even when key experts leave the organization, but at the same time gives an excellent basis for project publication or application for verification, thereby illustrating the organization's expertise and improving its reputation.

Sustainability Assessment

Remediation projects aim locally at a "cleaner environment", but yield secondary environmental impacts such as waste water or greenhouse gases. As today cost considerations and site-specificities often result in conventional treatment applications such as containment, "dig and dump" or "pump and treat", the significant sus-

tainability potential of innovative and in particular in-situ treatment technologies remains neglected. Consequently, the implementation of a sustainability assessment system accounting for the eco-efficiency of remediation measures could considerably contribute to strengthening the competitiveness of innovative and in particular in-situ technologies.

Case studies have shown that existing analytical sustainability assessment tools like life-cycle assessment (LCA) can mean enormous, and therefore, not viable additional work load in a remediation design process. Furthermore, LCA results for different impact categories tend to show synchronised results, thus illustrating a clear need for a simplified and more practicable approach. Such an approach is outlined in the following subsections (see also Müller (2007)).

General Procedure for Assessing Environmental Impacts

A simplified model protocol to analyse material- and energy-flows has been developed which in a first stage aims to identify environmentally relevant measures and in a second stage focuses on few selected impact categories such as energy consumption, water use, waste generation, and global warming. The recommendation is a tiered approach starting from a qualitative pre-assessment of wider environmental effects of remediation projects and technologies, recommending a simplified quantitative analysis as a central second tier of assessment. A full LCA is the third tier. Using a tiered or stepwise approach allows for variation in the amount of data and work required and the overall effort remains proportional to the size / costs of a project. In moving from a lower to a higher tier there is a growing demand on data and by the reduction of the level of uncertainty an increasing significance of the results. With regard to soil and groundwater remediation projects and technologies the assessment of wider environmental impacts will regularly include two tiers, a Qualification Phase and a Simplified Analysis of wider environmental impacts. A full LCA might be appropriate for large site remediation projects ('mega-sites').

Here, transparency and reproducibility are fundamental elements which require adequate reporting of all inputs, considerations and judgements at each tier.

Defining Options, Goal and Scope

As a prerequisite the remediation options under assessment have to be defined and explained. One remediation option, a conventional and frequently applied approach, serves as a "reference scenario" and baseline for comparisons.

Additionally, the overall goal(s) of the remediation project and the goal of the assessment of environmental impacts have to be described. The scope of the assessment procedure is defined by project (system) boundaries and the functional unit. Here, project boundaries are technical and geographical boundaries as well as the timeframe of the project.

Geographical boundaries are understood in a broad sense. Geographically separated remediation facilities are part of the 'system', as environmental effects caused by the operation of off-site-treatments have to be included in the overall assessment. Effects from installation or closure of such facilities are considered only if they are closely related or caused by the project itself.

Boundaries in time are defined along the duration of the reference scenario. Depending on the remediation approach and technologies theoretically employed within the reference scenario, the duration may vary from less than one year up to one generation. Mega-site projects where risk management will last for much longer periods, might be exemptions.

The 'functional unit' provides the basis for comparisons of remediation projects or technologies. Given the intention that remediation seeks to destroy or immobilise

contaminants the ideal overall functional unit is pollutant mass. As the approximation of this parameter may be difficult in a lot of situations,

'Cut-off'-Criteria are generally a part of the definition of the scope of a LCA. They have to be developed for tiers 2 and 3.

Qualification of Environmental Impacts (Tier 1)

The first tier for assessing environmental impacts gives emphasis to understand and qualify the relevance of processes which are part of remediation projects or technologies. Therefore the assessment is undertaken qualitatively, considering impact categories in a more generic way. The significance of wider environmental impacts depends on the intensity and duration of processes.

Each considered option is characterized by a comprehensive outline of key elements and major processes within a life cycle. The description should be supported by appropriate means of visualisation.

Adapted from Schmitz & Paulini (1999) and Suer et al. (2004) the environmental impact categories shown in Table 1 <table 1 goes near here> are recommended as a basis. Adaptations should be reported and explained.

According to the list of environmental impact categories and starting with a 'reference scenario' all options are classified with regard to the different selected environmental impact categories according to the likely significance of impacts. Related to each classification a brief explanation should give reference to most relevant elements and processes, with a high relevance being assigned to processes causing intensive or long lasting environmental impacts.

The results of the Qualification Phase shall be displayed by

- An overview table of all considered remedial options and the classification of the qualified environmental impact categories,
- figures introducing the key elements of each remedial option,
- tables or figures explaining the processes involved in the different key elements of a remedial option, indicating processes causing significant environmental impacts.

Simplified, Quantitative Assessment of Environmental Impacts (Tier 2)

The second tier for Assessing Environmental Impacts aims at enhancing the understanding of the relevance of different processes involved in remediation projects or technologies and at a first quantitative qualification of the significance of the caused wider environmental

Table 1:
List of Environmental Impact Categories for qualifying environmental impacts of remediation projects and technologies (Tier 1)

INPUTS	energy consumption	***SECONDARY IMPACTS***	global warming
	use of minerals		acidification
	land use		photochemical smog
	water consumption		ozone depletion
OUTPUTS	waste generation		eutrophication
	emissions to air		human toxicity
	emissions to surface water		aquatic toxicity
			terrestrial toxicity

impacts. The Inventory Analysis and the Impact Assessment are performed quantitatively but with a focus to

- those processes which have been assigned as being of major relevance and
- few selected impact categories.

For the purpose of identifying processes of major relevance in terms of the linked environmental consequences, the 'Cut-off'-value for the Life Cycle approach under tier 2 can be set to 20 %. Processes which are likely to cause less of the total balance can be neglected for Inventory Analysis and Impact Assessment.

According to the final list of relevant processes and environmental impact categories an inventory analysis and impact assessment is performed. The environmental impacts are calculated for all options under consideration. On the basis of the results for the 'reference scenario' the results of the further options can be normalised.

The results of the Simplified Assessment Phase shall be displayed by

- tables or figures explaining the processes involved in the different key elements of a remedial option and indicating processes with significant environmental impacts,
- an overview table on all considered remedial options and the results of the assessment of selected environmental impacts, and
- figures (e.g. barcharts) indicating the assessment results normalised with respect to the 'reference scenario'.

Environmental Efficiency Assessment in Land Remediation

Evaluation of land remediation options

To evaluate land remediation options for a specific site any assessment of wider environmental impacts should cover and report on Tier 1 and 2. The selection of the best suitable remedial option should consider separate specifically defined projects. The assessment of wider environmental impacts should be made on the basis of such specific projects. Possible trade-offs and synergies between projects can be indicated under the wider umbrella of a 'site remediation concept'.

Evaluation of innovative remediation technologies

To evaluate innovative remediation technologies it is recommended to employ a 'preliminary' assessment of wider environmental impacts, covering and reporting Tier 1 and 2. The innovative technology and the chosen conventional 'reference technology' should usually refer to the same remediation technology group.

According to the 'preliminary' assessment the monitoring of wider environmental impacts during the field demonstration has to be designed and included in the test plan for the demonstration project. Adequate documentation and reporting is required.

The report of a demonstration project should regularly include a section explaining and evaluating wider environmental impacts caused by the application of the technology and the results of the 'preliminary' assessment. Further specific sections should provide:

- descriptions of the chosen technology and the 'reference technology' and of those processes causing significant wider environmental impacts;
- description and results of the monitoring implemented during the demonstration phase;
- a report and the results of a simplified, quantitative assessment of wider environmental impacts; and
- the comparison of wider environ-

mental impacts against the 'reference technology'.

This tiered approach of assessing the wider environmental effects of remediation is expected to be useful to i) allow the comparison of different remediation technologies with regard to sustainability issues; ii) stimulate the consideration of wider environmental effects during the selection and implementation of remediation projects; and iii) make advantages of innovative remediation technologies visible and understandable.

Conclusions

Successful remediation projects are a key for market acceptance and uptake of innovative technologies. By providing technical guidance for remediation effectiveness, the certainty of successful remediation can be increased. Additionally, generic guidance for project reporting is an efficient tool for achieving transparent and traceable processes, thereby yielding reason-based "good quality" process documentation. From a strategic point of view, such guidance is a generic basis for technology verification processes. Moreover, the assessment of environmental efficiency of remediation processes reflects increasingly important issues of the ecological footprint of processes. Consequently, environmental efficiency assessment should also be part of a European Environmental Technology Verification procedure.

Overall, open questions regarding a viable ETV system in the field of soil and groundwater remediation remain, especially for in-situ applications which are characterized by tailor-made solutions and site-specific uncertainties. Consequently, the development of a sound, practicable and generally accepted European ETV system is regarded as a challenge.

Acknowledgement

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2.7 CL:AIRE – Building Confidence in Remediation

Jane Forshaw

ABSTRACT

How can we build confidence in the use of remediation technologies? This paper examines the specific issues at the technology level, including lessons learnt from past contaminated land projects. Other important influences include the effects of communication, customer behaviour in the market place and training and accreditation.

Additional insight is provided by an assessment of future scenarios which could impact on the contaminated land market in Europe up to 2015.

Introduction

The Environment Agency for England and Wales estimate that between 5,000 – 20,000 sites could present 'problem sites' under the Environmental Protection Act 1990.

The Water Framework Directive and the daughter directive on Groundwater also require action to reduce contamination. The Environment Agency (England and Wales) estimate that we have lost 425,000 cubic metres of groundwater every day since 1975 due to pollution.

There are certainly significant and complex remediation challenges; the question is how can we build confidence in the application of clean up technologies?

CL:AIRE (Contaminated Land: Applications in Real Environments) is an environmental industry-focused, not-for-profit organisation created in 1999 in the UK to facilitate the field demonstration of remediation research and technology, including innovative methods for site characterisation and monitoring. CL:AIRE combines the roles of facilitator, reviewer and knowledge transfer partner for scientifically credible remediation projects. As facilitator the organisation has completed or has ongoing 36 Technology Demonstration and Research Projects across the country with over 70 partners such as Rio Tinto, Shell, National Grid and English Partnerships.

The uniqueness of the organisation is its interaction with a composed panel of independent land remediation experts from industry and academia, called the Technology & Research Group (TRG). The CL:AIRE TRG act as an independent advisory panel who review and vet all remediation projects applying to become 'CL:AIRE projects', so that reliable, scientifically credible and authoritative information is

supplied to the marketplace. Knowledge transfer provides the final piece of the CL:AIRE process. All CL:AIRE projects passing through this review facility are disseminated or made available to its contacts of 4700 people working within the European contaminated land community but principally the UK.

CL:AIRE has a unique position within the UK contaminated land industry with respect to links with government departments and organisations, and points to CL:AIRE's overall strategy for building confidence in the contaminated land marketplace.

Indeed, key responsible UK Governmental Departments require that the Regional Development Agencies engage CL:AIRE on all major regeneration schemes that involve remediation. Similarly, UK Research Councils recognise the value of CL:AIRE's dissemination programme to UK research and pay CL:AIRE a facility cost for these services for each Research Council project that is also approved as a CL:AIRE Research Project.

CL:AIRE is increasingly dedicated to both driving forwards standards in remediation and sharing knowledge within Europe, and is forging partnerships with similar European organizations such as SKB in the Netherlands and through its work on projects such as EURODEMO.

Building Confidence at the Specific Technology Level

One could argue that if treatment costs were 1,500 Euros/tonne then lack of confidence would be much less of an issue – the cost dynamic would encourage greater risk taking.

In the absence of such marketplace drivers we need to build confidence by:

- ensuring thorough site characterisation
- creating appropriate clean up objectives
- ensuring objectives are met
- understanding how a remediation technology couldwork.

How do we choose the right technology? Many specific parameters apply but in broad terms one needs to:

- understand the nature of contamination
- secure appropriate delivery partners
- build in enough time to derive the correct solution
- understand the operating window for the technology
- undertake appropriate pilot trials with scientific testing.

In considering specifics in selection of appropriate technologies one might also consider:

- site size
- proximity and type of neighbours
- distance to treatment facilities
- client preference
- requirement for the reuse of material on site
- time available for treatment.

CL:AIRE is interested in sharing the learning points from projects, overarching points include:-

- need for relevant, reliable data
- include a process for validating and
- invalidating data
- good site investigation data is critical
- treatment trials are important, and field trials give the greatest confidence but time needs to be built in

for testing

- early involvement of technology vendors
- odour issues can sometimes be overlooked when there is a need to rework materials on site.

Communication is crucial in ensuring that remediation projects proceed smoothly on site. Particular efforts should be made to keep local communities informed if one is to raise confidence. It is important to remember that you are dealing with real lives. When communicating it is important to:

- give the best advice
- be honest including if you do not know the answer
- show confidence
- reassure that you have best interests in mind
- provide the options
- remember that even a small project has significance
- involve local media who usually leap on a 'scare story'.

Building Confidence through Customer Behaviour

A model which reflects the change in customer behaviour as a technology matures in the market place has been developed by S. Francis Bourne and is known as the Adoption Process (see Fig 1).

In this model innovators are the people prepared to risk money inventing new products/ technologies, and are the 'mad inventor' types.

The early adoptors are the people who take up the technology successes e.g. plasma screen TV's and Ipod's.

They are also prepared to take a risk, but their choices are informed by the innovators. These people are the section of the market who can most influence the potential take up of new technologies to get the acceptance by the wider marketplace.

Figure 1: The Adoption Process

CL:AIRE actively seeks out the contaminated land 'early adopters' to accelerate the take up of technologies and speed the acceptance of these new approaches to a larger audience.

'Laggards' are the people who still do not own a microwave! These people may also be technology and/or risk adverse. They may also be unaware of the possibilities. Many public sector clients could be said to fall into this bracket and yet these people are important gatekeepers to the take up of new technologies as they specify work in the contracts.

If we want to increase the take up of the state-of-the-art to improve then we must also work to improve knowledge and confidence with this customer base, and improve approaches to risk taking.

Building Confidence through Training and Accreditation

Many studies in the UK such as the Soil Guideline Value Task Force (SGVTF) and the National Brownfield Strategy Workshop 13th December 2006 demonstrated concerns for the poor levels of skills across the contaminated land sector. The SGVTF reported on a competency framework

Table 1: Strategic roadmap for UK Contaminated Land Remediation Sector up to 2015

	2006-08	2009-12	2013-15
Market + Externals	• Continuation and enhancement of UK remediation tax breaks, other incentives • Introduction of practical waste guidance from DEFRA • Improved clarity on risks for assessment from DEFRA, EA • Transposition of EU environmental liabilities directive • Major UK developments in Thames Gateway, Olympics • Increase in landfill tax escalator	• EU soil framework direvtive • 80% brownfield quota for new housing in UK • Possible opening of Asian markets for remediation • 2012 Olympics in London • Part IIA-driven remediation	• UK Olympic legacy • MOD execute its obligations on land cleanup • Potential legislation in UK to ban landfill of soils
Product and Service Offerings	• New assessment and remediation solutions for current sites	• New remediation solutions for complex sites	
Enabling technologies	• Improved application of current technologies, funded R&D for new technologies and improved brokering	• Electrochemical, advanced thermal and biochemical solutions	• Breakthroughs in biokinetics and nanotechnology
Required UK Industry enablers	• Improved training and accreditation • Improved remediation plant capacity • Ongoing DTI funding for near-market and long-term R&D • More realistic remediation contract liabilities and terms • Govt database on remediation technology approvals • Enforcement of Part IIA by Local Authorities	• DTI trade mission to E Europe for remediation • Consolidation & cooperation in UK suppliers • Availability of improved market knowledge	

demonstrating the range of skills provision needed from general regeneration to health-based impact assessments.

However fundamental questions remain such as:

- Are the courses and guidance in place and it

  is just a question of take up?

- Are there real gaps in the provision of courses?

- How do we incentivise learning, eg. evidence- based continuous professional development?

One answer could be to set up an accreditation scheme for contractors and consultants which would require evidenced-based competency. This would include professional competency of staff, financial stability and technological and plant capabilities.

In this way confidence could be improved by the award of accreditation from an independent body.

However, such a scheme would need to take account of the encouragement of innovative technologies.

Environmental technology verification is also being explored at the moment but is fraught with difficulties such as:

- verification could lead to less thinking about the technology but move into warranties and potential litigation

- more tricky for clean up technologies,

- perhaps better for monitoring and sampling kit

- technology performance envelopes have so many unique features that it is difficult to guarantee transferability.

Future Scenarios

Useful analysis of the merging markets for contaminated land technologies has been undertaken by The UK Centre for Economic and Environmental Development (UK CEED).

The roadmap covers the developments required in products, services, supporting technology platforms and underlying industry capabilities for the period to 2015.

The roadmap could be viewed as a vision for how contaminated land companies can seize on these opportunities.

In addition, the full impact of global warming is slowly shifting the way carbon is evaluated in the economy.

CL:AIRE is working with National Grid and Dupont to prepare a carbon calculator for remediation technologies and the comparable carbon impact of landfilling.

We believe that in future it will be just as important to tick a health and safety box as well as a low carbon technology box.

The UK CEED report also examines key drivers which are predicted to impact on the contaminated land industry. The influence of such drivers will also offer confidence for instance:

- Political drivers
  - * degree of EU harmonisation
  - * EU expansion
- Economic drivers
  - * Land/Property values
  - * Public sector funding for remediation, especially in Eastern Europe (eg tax incentives)
- Sociological drivers
  - * public view of contaminated land
  - * public desire to protect green space

Technological drivers

  - * cost of remediation
  - * availability of new assessment and monitoring technologies
- Environmental drivers
  - * evidence of health impacts from
- Legislative drivers
  - * development & harmonisation of land remediation standards
  - * proposed EU directives Waste, Soil, Water, Groundwater.

Different scenarios can be drawn for the industry based on the uncertainty and degree of impact for each driver.

Conclusions

To completely address confidence building it is necessary to take careful account of a wide range of influences.

It is also useful to step into future scenarios to assess how external influences may impact on confidence based issues.

The provision of peer-reviewed, scientifically robust case studies such as those provided by CL:AIRE (UK), SKB (Netherlands) and the EURODEMO project assist in raising confidence by transparently demonstrating when a technology can be either successful or inappropriate.

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2.8 Use of Integrated Planning Tools for Revitalization: SMARTe (U.S.) and START-UP Plan (Germany)

Ann Vega, Juergen Braun, Dale Medearis

ABSTRACT

In 2001, the US-German Bilateral Working Group (BWG) identified more than 40 obstacles to site revitalization which occurred in both countries. From 2001-2005, the BWG developed tools and techniques for overcoming these obstacles. Five joint workshops were held on the following revitalization topics: economic tools, environmental risk assessment and communication tools, project management and marketing tools, social aspects of revitalization and sustainable reuse.

Information from these workshops, in addition to information collected from "model" projects, was used to develop SMARTe (U.S.) and the START-UP Plan (Germany). Sustainable Management Approaches and Revitalization Tools – electronic (SMARTe) is a web-based, decision support tool that helps communities and other revitalization stakeholders select revitalization options. The START-UP Plan was developed to assist redevelopment stakeholders in preparing a target-group specific, integrated project and business plan. Currently, these products are being applied at different sites/areas within the U.S. and Germany, respectively, in order to test their usefulness and usability.

Introduction

Since 1990, the United States Environmental Protection Agency (USEPA) and the German Federal Ministry for Education and Research (BMBF) have worked bilaterally to identify, understand and apply innovative technologies and policies for remediation and sustainable revitalization of contaminated sites in both country.

In 2000, the U.S.-German Bilateral Working Group (BWG) embarked on its Phase 3 with a focus on providing tools and techniques for facilitating revitalization of potentially contaminated sites. Also in 2000, the Interstate Technology and Regulatory Council (ITRC) in the U.S. joined the BWG. By 2001, the BWG had identified more than 40 obstacles to revitalization which occurred in both countries. From 2001-2005 (Phase 3), the BWG worked to develop tools and techniques for overcoming these obstacles.

The BWG selected "model projects" (projects which were characterized as having success in at least one area of revitalization) in each country. There were 13 projects selected in the U.S. and 10 projects selected in Germany. (Additional information on the model projects is available at: http://smarte.org/smarte/resource/sn-model-projects.xml?page=1.) The BWG requested that model project representatives participate in five joint workshops (and two final conferences) on the following revitalization topics: economic tools, environmental risk assessment and communication tools, project management and marketing tools; social aspects of revitalization and sustainable reuse. Information collected from the model projects and the model project representatives was used to develop the two primary Phase 3 products.

Sustainable Management Approaches and Revitalization Tools – electronic (SMARTe)

is a web-based, decision-analysis tool, developed in the U.S. to aid communities and other revitalization stakeholders in evaluating options for site revitalization. In Germany, the START-UP Plan was developed to assist redevelopment stakeholders in preparing a target-group specific, integrated project and business plan. The two products complement each other in that information from both Germany and the U.S. are contained in both. Currently, both products are being applied at different sites/areas within the U.S. and Germany in order to test their usefulness and usability.

The following sections will give an overview of SMARTe and the START-UP Plan and share case study information regarding the use of these products in the U.S. and Germany, respectively.

SMARTe

Purpose/Description

SMARTe (at smarte.org, see Figure 1) is a web-based decision analysis tool that provides information, tools, and decision analysis to support revitalization and the evaluation of future reuse scenarios of a potentially contaminated site. In general, SMARTe integrates the following key elements: visioning (future land use), stakeholder involvement (including communities), economic viability (financing, market costs and benefits), environmental issues (site assessment, risk assessment and risk management), liability, and community benefits. It currently contains information, links, best practices and electronic analysis tools that can help stakeholders work through the revitalization process. In October 2007, SMARTe will have full decision-analysis capability so that the interests and needs of different stakeholder groups can be considered. SMARTe will use multi-criteria decision analysis to allow a diverse group of stakeholders to compare different reuse options and reach agreement regarding the reuse of a site/area.

SMARTe provides an interactive technical guidance program with analysis capabilities developed solely with open-source software employing World Wide Web Consortium (W3C) standards. The open-source philosophy is aimed at sharing information at all levels, gathering and responding to feedback for continuous improvement, and encouraging users to supply functionality and content. For SMARTe, this consists of sharing content and all resources, operating a continuous feedback option, and encouraging users to submit case studies that can be shared with the SMARTe community of users.

Figure 1: SMARTe Home Page

Development Team

SMARTe is being developed cooperatively developed by the USEPA's Office of Research and Development and Office of Brownfields Cleanup and Redevelopment, the German BMBF, ITRC, and other experts including those from universities, local governments, lawyers, developers, community groups, private consultants, and regulators. All users are invited to give continuous feedback (using the feedback buttons around the site) and are therefore also considered part of the development team.

Development Approach

SMARTe's components are being developed in a phased approach (see Figure 2). The phases of development start, for each component of SMARTe, with relatively simple textual information and access to databases, followed by stand-alone analysis tools that support each component of

SMARTe, and then completed by integrating all components using a multi-criteria decision analysis engine.

Feedback from the user community and new information received through workshops, the open literature, participation in national and international conferences, experts, and review comments are incorporated into SMARTe on an annual basis. SMARTe also is peer reviewed and reviewed by quality assurance personnel on an annual basis.

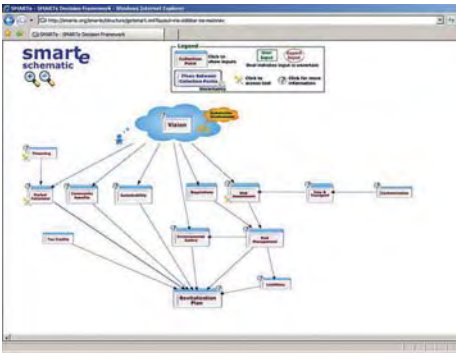

Figure 2: SMARTe Schematic

SMARTe 2007

SMARTe 2007 includes a variety of tools as well as basic functions (for example, search functions and feedback capability). Information, links and additional resources are currently provided in SMARTe 2007 for the following topics and subtopics:

- Getting Started (revitalization plan strategy, project stakeholders, timeline of events, case studies, previous site use examples, environmental stigma)
- Site Description
- Future Land Use (vision, previous plans, revitalization motivation, regional and local needs, marketing the project benefits, sustainable practices, keys to success, innovative project features, construction/demolition)
- Community Involvement (description and demographics, communication)
- Environmental Management/Site Assessment (USEPA Brownfields Road Map, infrastructure considerations, all appropriate inquiry, environmental schedule)
- Environmental Management/Risk Assessment (public health, USEPA's Integrated Risk Information System (IRIS), USEPA's Exposure Factors Handbook, National Exposure Research Lab)
- Environmental Management /Risk Management (risk-based corrective action, remediation/cleanup, long-term stewardship)
- Liability (liability risk concerns, regulatory liability, third party liability, environmental insurance)
- Financial Analysis (financial management and controls, market analysis, economic risk analysis, estimating economic viability, lender issues, investor issues, key financial indicators, information and advisory services, long term economic impacts)
- Sources of Money (public financing, private financing, foundation funding)
- Project Schedule
- Other (model projects, internet links, bibliography, glossary, acronyms, quality assurance, US-German Workshops)

Additionally, the following checklists are available:

- Land reuse options
- Select a consultant
- Select a lawyer
- Purchasing a brownfield property

- Finding and insurance broker
- Selecting a developer
- Understanding units of measurement
- Writing a request for proposals for environmental site assessment or cleanup

Finally, the following analysis tools are available:

- Public participation
- Potential stakeholders
- Net revenue calculator
- Financing resources
- Human health risk calculator (early stages of development)
- Site characterization
- Monitoring data analysis

SMARTe is scheduled to be updated annually to make revisions and improvements to the site based on user feedback. The complete decision support capabilities will be available in SMARTe 2008 (scheduled for release October of 2007).

Outreach

To raise the awareness of SMARTe's existence, it is presented and demonstrated at national and international conferences, workshops, and training sessions periodically throughout the year. In addition, a tutorial icon on the web-site provides users with navigational instructions for SMARTe. It is important to note that because SMARTe was developed using open-source software, the code is freely and completely accessible world-wide. Based on web-site usage, 57 countries have accessed SMARTe to date. USEPA does request that other countries who find the code useful provide this information to us (either through the feedback buttons or direct contact). It is very important to USEPA to receive constructive feedback regarding the utility of the site. Additionally, it is particularly useful for USEPA to receive information regarding any impacts SMARTe has on a specific project.

Feedback

Feedback can be entered by any user at any location on the SMARTe web-site. Users simply click on a feedback button and enter their comment. The comment is placed into the feedback database which is accessible by the members of the SMARTe Technical Development Team (STDT). As team members review and respond to comments, non-anonymous users (i.e., those who set up a user account) will receive email messages documenting progress. If the user suggests changes and the STDT accepts these suggestions, the changes are first made to a non-public site, and then appear on smarte.org after they have been peer reviewed and satisfied quality assurance requirements.

Testing – Beta Test Sites

The tools and resources within SMARTe continue to be tested and expanded for the broadest possible application. SMARTe testing occurs via "beta test sites." Beta test sites are U.S. brownfield/site revitalization projects that are in the beginning stages of site redevelopment or that have encountered an obstacle preventing the project from moving forward. USEPA identified several potential sites that would be willing to use SMARTe to determine whether or not it was useful in getting them started and/or in overcoming any obstacles encountered. Beta test sites provide direct and practical feedback on the usefulness and usability of SMARTe along with providing input regarding future tools. USEPA currently has three active beta test sites: Stella, Missouri (MO); Rittman, Ohio (OH); and Scottsbluff, Nebraska (NE). Each beta test site works with two SMARTe liaisons: (1) a USEPA employee and (2) a Technical Assistance to Brownfields (TAB) Coordinator (grant given by USEPA). Two of the beta

test sites are just beginning to provide SMARTe feedback; however, the residents of Stella, MO have been providing feedback since the spring of 2005.

Stella, MO

Stella, MO became a beta test site in December 2005. Stella is a small, rural community in southwest Missouri. The current population is 178. However, previously, a now-closed hospital (Cardwell Memorial) drew many people to the area to live and work in Stella. Many doctors received their education at this hospital and the hospital served people in two counties. The Cardwell Hospital closed in the 1980s and the site began to deteriorate. In October 2004, Stella residents approached USEPA's Region 7 staff concerning the abandoned hospital site. Residents were concerned that the dilapidated building posed a safety hazard, primarily due to the proclivity of children to play inside of the building. In February 2005, USEPA Region 7 received a petition signed by over 700 individuals who lived in and around Stella, requesting that USEPA help cleanup the former Cardwell Hospital site. USEPA Region 7 conducted a sampling investigation in May 2005 at the former hospital site and attended an initial community meeting to discuss the status of site. In August 2005, USEPA Region 7 decided that the site was eligible under CERCLA (Superfund) to conduct removal action primarily due to asbestos contamination.

In September 2005, USEPA Region 7 requested assistance from Kansas State University (KSU) to help with reuse planning. A KSU professor and Technical Assistance to Brownfields (TAB) Coordinator travelled to Stella to see the site and meet with the core revitalization committee. KSU Landscape Architecture students worked with the town of Stella from November 2005 to April 2006 to develop a plan for the reuse of the Cardwell Hospital site. During this process, USEPA Region 7 and the KSU TAB Coordinator suggested to USEPA's Office of Research and Development (ORD) that Stella would be a good SMARTe beta test site. The application was completed and Stella became the first SMARTe beta test site in December 2005. In January 2006, USEPA ORD representatives travelled to Stella to meet with the core revitalization committee and to demonstrate SMARTe. USEPA began monthly conference calls with the Stella core committee in March 2006 to obtain SMARTe feedback. USEPA Region 7 began demolition [Fig. 3] of the Cardwell Memorial Hospital on July 5, 2006 (delays occurred due to Hurricane Katrina). The site was deemed ready for reuse in August 2006.

Figure 3: Cardwell Memorial Hospital Demolition, Stella, Missouri

Stella residents have provided several important pieces of SMARTe feedback since becoming a beta test site. The main obstacle Stella faced was finding funding for revitalization. SMARTe has helped Stella community members:

- Become educated regarding where to start and what questions to ask
- Identify social, environmental, and economic issues to be aware of/ keep in mind
- Find ideas for financial resources for site characterization and revitalization
- Obtain information related to preserving cultural heritage

Additionally, Stella residents have pro-

vided suggestions for improving SMARTe such as including additional information regarding:

- Building a gas station - guidelines, permits, restrictions.
- Funding for ball parks and playgrounds and any guidelines, restrictions, etc.
- Creating a health clinic - guidelines, restrictions, funding
- Creating a chemical-free golf course
- Real estate issues, for example, titles and deeds and how to find information related to land ownership
- How to create a storm shelter

USEPA plans to continue to work with Stella residents through at least December 2007.

Future Activities

Future activities include on-going beta testing, outreach, continuous user feedback, and annual updates to add tools and address comments. Future versions of SMARTe will expand from a site-specific approach to a regional approach including additional information regarding: regional and local land use planning, sustainable reuse, project management, and brownscape design.

By combining access to information and data with environmental risk, community benefits, and economic analysis tools, SMARTe will enhance the decision making process and help stakeholders develop revitalization plans that can become marketing tools for their site. By providing potential solutions for sites where many obstacles and few benefits are perceived (that is, facilitating the reuse of contaminated sites), SMARTe will promote successful, long-term site revitalization.

START-UP Plan

Purpose / Description

The START-UP-Guidance was developed on the German side by the START-UP Project Group consisting of representatives of consultancies, universities and research institutes. The START-UP-Guidance supports the parties involved in brownfields projects in the preparation of development concepts. It describes the interplay between the planning, economic, social and ecological aspects of brownfields revitalization. Based on the START-UP Guidance, a START-UP-Plan that is a target-group specific, integrated project and business plan tailored to a specific brownfield can be developed. START-UP-Guidance and START-UP-Plan are intended for property owners, investors and banks, real estate developers, politicians, residents and other affected parties, municipalities, public authorities, organizations, the scientific community, professionals in the field, and those required to carry out clean-ups.START-UP Guidance

START-UP Guidance

The purpose of this short but comprehensive guidance document is to encourage site-owners, and investors but also municipal decision-makers to redevelop brownfields and to provide a helping-hand through the labyrinth of information, interests and risks, be they real or assumed (Barczewski, et.al., 2005; Ferber, et.al., 2005). In particular, the START-UP Guidance focuses on:

- Identification of the major stakeholders whose contribution is needed for successful Brownfield planning and redevelopment.
- Development, design, and presentation of a project vision,
- Cooperation and effective communication among redevelopment stakeholders of brownfield project developments.

- Links between the most crucial elements of brownfield redevelopment, covering topics such as:
  - * Environmental conditions, examples and approaches for contaminated site identification and cleanup.
  - * Economical considerations for projects, including how to raise funds, gain support, and finance a brownfield project.
  - * Social concerns involved during the planning and development process, including community planning, land reuse issues, and community revitalization groups.
  - * Profiles of best practice examples that can be adapted and used for future redevelopment sites.

Additionally, the START-UP-Guidance contains best practice examples of brownfield redevelopment projects:

- The inner harbour of the city of Duisburg,
- The „Heiterblick barracks", city of Leipzig,
- The "Burbacher Huette", today known as "Saarterrassen",
- An industrial estate in the city of Lennestadt,
- The former „Okal"-site, city of Titisee-Neustadt.

The ultimate goal of the START-UP- Guidance is to enable the reader to compose START-UP Plans (site-specific brownfield redevelopment business plans).

START-UP Plan

The START-UP-Plan focuses on information deemed critical for the respective stakeholders (urban planners, real estate experts, banking experts, residents, etc.). It organizes unstructured information, which may be available in databases, or as concepts or professional assessments and draws attention to the key topics necessary for information transfer and communication between involved parties, project planning and securing project funding. The aim of a START-UP-Plan is to obtain a scheme that comprehensively describes the economic, environmental, and social risks and opportunities of the planned project and thereby to enable and support an evaluation of the developed concept (Fig. 4).

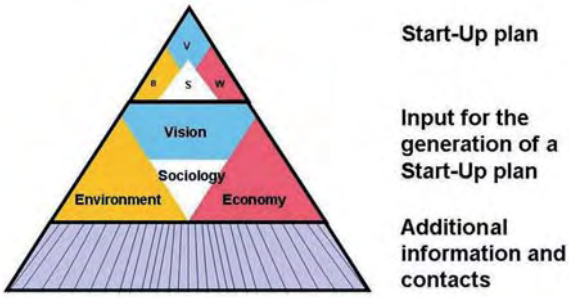

Figure 4: Information Pyramid for START-UP Plan

The description should be written in such a manner and in such detail as to permit all stakeholders to understand and evaluate the content of the plan. In consequence it has to:

- be brief,
- Be understandable at a glance,
- Promote an integrated view of the overall costs and benefits,
- Promote the thoughtful selection of issues which are important in a particular project,
- List frequently asked questions of stakeholders,
- Describe innovative ideas,

- Describe lessons learned,
- Give hints and ideas for teaming and tasking,
- Outline development steps and suggest sequential orders for them,
- List references,
- Help to best present information,
- Give information regarding key elements of project plans,
- Emphasize budgeting (completeness and smart estimates) and budget controls.

The following steps for the development of a START-UP-Plan are recommended:

- Analysis of the key features of the project idea,
- Recognition of the need for integrated presentation of the project idea,
- Determination of the audience, who is of key importance for the project,
- Identification of the key information to be given to the audience,
- Focus on key information in which the audience is interested,
- Identification of the procedure to collect the information,
- Design of the plan by thinking about how best to present the information.

Pilot-Testing the START-UP Plan

Current research showed that many guidelines pertaining to the management of brownfields were lacking in the terms of practical applicability and, hence, were rarely used (Schrenk, 2004, Samtleben and Schrenk, 2007). As a direct consequence, the START-UP Guidance was put through a four stage test.

Phase 1: Design of a questionnaire, selection of test sites

Phase 2: Drawing up the START-UP Plans based on the START-UP Guidance

Phase 3: Analysis of the questionnaires, Workshops to discuss the START-UP Plans, Interviews with consultants

Phase 4: Implementation of the outcome in the START-UP Guidance.

Since people tend to be "blind" to their own shortcomings, the test was not conducted by members of the research group but through external consultants who had no prior knowledge of the START-UP guidance. The test was partially subsidized by the BMBF (Federal Ministry of Education and Research) and site owners could apply and suggest a consultant to draw up the actual START-UP Plan. One requirement to receive the subsidy was that the consultants had to actively report shortcomings and attend workshops after completion of the START-UP Plan to ensure that possible drawbacks of the guidance were recognized and mended.

The Pilot Sites

<u>The former textile plant Lautex</u>

This site is located in the state of Saxony in former East-Germany. The site extends over 10,620 m^2 of which 3,510 m^2 are covered with buildings. Currently, some of the buildings are used as a garage or for storage (Fig. 5). The site was bought by the city of Dürrhennersdorf in order to revitalize it. There is some contamination in the subsurface; but, according to state legislators, no active remediation is necessary.

The new owners have no plan for future use, so the START-UP Plan was developed to make recommendations regarding economically feasible management and revitalization options.

Figure 5: Textile Plant Lautex, Saxony

The former railroad yard Stuttgart

This property extends over an area of approx. 22 ha and is a prime location in the city of Stuttgart, one of the most industrialized regions of Germany (Fig. 6). It is located next to the mineral springs and public pools, the fair-ground, Gottlieb-Daimler-Stadium, Carl Benz Center, Porsche Arena, Daimler Chrysler Museum, and the old city center of Bad Cannstadt. After the Deutsche Bahn closed the yard, the buildings were rented to tenants such as trucking companies and scrap metal merchants. By 2004, some 20 renters with 57 different businesses were present on the site. The START-UP Plan was implemented for a part of the site. It was developed to take into consideration the needs of the city of Bad Cannstadt (residential areas and small businesses) as well as the new owner (City of Stuttgart) and the various renters.

Figure 6: Former Railroad Yard, Stuttgart

The Hart van Zuid site in Hengelo, Netherlands

This site extends over approx. 50 ha. It is a historic site (old steel industry) and is located between the railroad station and the "Twente Kanal" (Fig. 7). Currently, some of the area is used by the metal and electronics industry, but most of it is not in active use. The goal of the START-UP Plan was to find a concept to revitalize the area in an "upper-class" residential living and working area. Furthermore there are possibilities that museums and the branch of a university could be relocated in the area.

Figure 7: Hart van Zuid Site, Hengelo, Netherlands

Current Status

The START-UP Plans have been drawn up and presented to the site owners as well as the START-UP Project Group. Generally, the owners were very happy with the outcome and the ideas they obtained regarding their sites. One of the START-UP Plans' main features is their brevity. Within approximately 10 pages, the reader obtains a good idea of options for the property.

One main focus when offering the START-UP Plans was that the sites were to represent different geographic, demographic, and economic locations. While the Stuttgart site, for example, is located in a demographically gaining and economically booming area, the Lautex site is the opposite. Nevertheless, the START-UP Plans were usable to draw up possible management options for the different locations.

In late 2006, the questionnaires and the outcome of the workshop were evaluated and incorporated into the START-UP Guidance. Hence, currently the new and improved "Start-Up Guidance 2007" is available for use to consultants, site owners, cities, etc.

Conclusions

Sustainable development of urban regions is a high priority in Germany and the United States. Nowhere is this better reflected than in the ambitious policies to restore derelict and contaminated properties. As Germany and the U.S. work to sustainably redevelop contaminated properties, they are turning with greater regularity to the other to collaborate on the development and application of innovative tools and programs. This has clearly been the experience in the creation and testing of SMARTe in the US and START-UP in Germany. Consensus has already emerged proving the benefits gained through these unique and powerful decision tools SMARTe and START-UP are uncomplicated in their concept, powerful in their applications, public in their access, and proven in their results.

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Samtleben, J. and Schrenk, V. (2007): "Online database on land management – an effective tool to support practitioner in land management and brownfield recycling" CABENET-REVIT Conference Stuttgart, April 25-27, 2007

Relevant Web Sites

U.S.-German Bilateral Working Group: www.bilateral-wg.org

SMARTe: www.smarte.org

START-UP Plan: www.vegasinfo.de/start-up/

ITRC: www.itrcweb.org

2.9 PROMOTE- Verifying the Performance of Environmental technologies

Thomas Track

ABSTRACT

Implementation of innovative technologies needs a good strategy to overcome barriers and to be successful on the market. Environmental technology verification (ETV) is recognized for its importance in most highly-industrialised countries.

PROMOTE aims to provide protocols for ETV in the field of soil-groundwater remediation and site characterisation/monitoring. By this means PROMOTE will support fast market entry and acceptance for these technologies. PROMOTE will provide a verification system that has independent quality objectives. This kind of ETV will benefit new innovative technologies as well as established ones by providing them with sound credentials for the EU27 market.

At the current stage, PROMOTE has approached stakeholders to actively comment on and review the preliminary project results. The outcome of the PROMOTE project is likely to influence further European plans for ETV.

PROMOTE is a European funded FP6 research initiative of 12 partners from 6 EU member states.

Open up markets for environmental technologies

PROMOTE is developing an efficiency control and performance verification (ETV) system for soil/groundwater remediation and site characterisation/monitoring technologies. This activity is directly related to the Environmental Technologies Action Plan (ETAP) of the European Commission, where a lack of confidence in novel technologies and approaches has been listed as one of the most prominent barriers for technology implementation.

A widely accepted and reliable system for performance testing and verification – ETV - was identified as a key tool to overcome the acceptance barrier for innovative technologies. In addition environmental technology verification and its acceptance by the 27 EU-Member States would provide a tool for allowing technologies, verified in one EU-Member State, to enter markets in other EU-Member States much faster.

A Preliminary European ETV System for Monitoring and Remediation Technologies

PROMOTE developed a basic system of environmental technology verification for monitoring and remediation technologies. By doing so PROMOTE defined the steps of the verification procedure. The

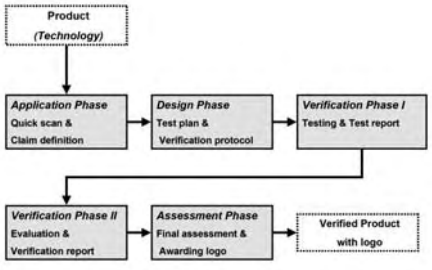

Figure 1: Basic steps of verification

preliminary ETV procedure is designed as a vendor driven system. It is meant to provide valid results of a technology using fast, easy, and cost efficient ways. The procedure is divided in four phases: application, design, verification and assessment (Figure 1).

For the basic ETV system formal entities involved and their responsibilities were defined. The working procedure for the ETV system was set up. The verification phases consist of max. 11 steps to come to a verified technology (Figure 2).

Figure 2: A preliminary sketch of a European ETV system – Formal entities and their work relations to each other as suggested by PROMOTE.

The obligatory forms, lists, protocols and guidelines that are required to run the ETV procedure were defined and are actually under testing.

Within the first assessment of the procedure, the technology development stage and the scale of complexity of technologies turned out as most important points to be considered in the verification process. Dependent on the development stage of a technology the efforts to be spend in time and money are varying due to differences in information and expertise availability.

Bringing innovation to the market is one of the main goals for the ETV approach besides facilitating the access to new European markets and the promotion of environmental technologies. Thus also technologies at prototype stage should be considered to speed up their market implementation.

To cover the wide variety of complexity and scale of site characterisation/monitoring and remediation technologies, a matrix of components for verifying claims has been set up (Figure 3).

<Figure 3 goes near here>

Interacting with stakeholders

At the current stage of the project, PROMOTE has approached stakeholders to actively comment on and review the preliminary project results. Two open stakeholder meetings were held in November 2006, one in Brussels, Belgium and the other in Frankfurt am Main, Germany. At these meetings a good mixture of representatives from various countries and groups, i.e. technology providers, regulators, service providers, landowners, consultants, and researchers came together. Participants expressed their particular interest, potential benefit, as well as concerns of a system for environmental technology verification. The basis for the discussions were generic verification procedures that can be applied to all technologies in the field of soil-groundwater

Components of environmental technology:	Technical device	Monitoring technology	Remediation technology
1. Technology principle, fundamentals, basic scientific principle	X	X	X
2. Manual, instruction sheet	X	X	X
3. Personnel qualification	X	X	X
4. Design		X	X
5. Technical device design and operation	X	X	X
6. Remediation process, operation and maintenance			X

Figure 3: Matrix of components for verifying claims

remediation and monitoring as proposed by the PROMOTE consortium. This included establishment of new governmental bodies, data dissemination policy, reliability and cost aspects. The discussions were quite intense since the outcome of the PROMOTE project is likely to influence further European plans for environmental technology verification.

The Main goals of a European ETV system that stakeholders with different perspectives agreed upon can be summarised by a few key points. An ETV system should be (I) valid, (II) fair and transparent, (III) cost-efficient and fast, and (IV) unbureaucratic. Since the last point may generally appear to argue against any ETV system, especially for technology providers, it has been pointed out during the meeting that this is particularly not the case for a European ETV-system. That is, as the European market has been generally characterised by its division into historically grown national and occasionally international markets. The real benefit of a European ETV system is its potential to unify these markets and hence allow technology providers access to the EU27 market.

ETV system testing and demonstration

The testing strategy follows a tiered approach of reference site, project field site and open field site testing. For the reference site testing of the ETV procedure the test containers (up to 220 m^3) are set up and arranged according to the requirements of the different measurement devices.

The project field site testing will be done in Bydgoszcz/Poland at a former gaswork site in early autumn 2007. Also in autumn an open call for technology testing in early 2008 is planed.

Elaborating a CEN Workshop agreement

To provide a sustainable procedure to estimate the performance of site characterisation / monitoring and remediation technologies for soil-groundwater systems, PROMOTE decided to initiate the elaboration of a CEN Workshop Agreement.

The CEN Workshop is a flexible working platform open to the participation of any company or organisation, inside or outside Europe, for rapid elaboration of consensus documents under the umbrella of the Comité Européen de Normalisation (CEN).

Generic test protocols, guidelines, definitions of key parameters, etc. as available from the PROMOTE project and potentially other organisations provide the basis for the workshop procedure. The CEN Workshop Agreement resulting from the formal workshop procedure will provide a voluntary agreement on ETV for a whole class of technologies in the field of site characterisation/monitoring and remediation technologies for soil-groundwater systems. Such technologies are not easily standardized, since field application usually needs a variety of adjustments. These adjustments are necessary in order to meet specific requirements that result from site conditions in terms of geology; hydrology; soil-/hydro-/bio-chemical environment; pollution compounds and pollution pattern.

The definition of a pre-standard, in the form of a CWA acknowledges the difficulties arising from the complexity of the soil-groundwater system and, at the same time, will deliver transparency by measuring all technologies along the same lines.

Acknowledgements

PROMOTE is funded by the European Commission within the 6th Framework Programme.

Further information on PROMOTE and ways to contribute to the CEN Workshop and to the open technology verification test are available on the web: www.promote-etv.org or contact us directly (email: track@dechema.de)

2.10 Brownfield sites: Instrument for the Determination of Site Suitability and the Analysis of their Potential

Tobias Großmann, Volker Schrenk, Alfred Ruther- Mehlis

ABSTRACT

The aim of this project is the development of an instrument, which permits the identification and evaluation of brownfield sites according to their value of benefit for project developers and for the city department with respect to a sustainable development. Taking into account differing viewpoints of the stakeholders and splitting up the evaluation of sites according to the differing interests will make a significant contribution to the reuse of brownfield sites. The tool is based on a method consisting of three steps:

- **Identifying the specific potential of each brownfield site.**
- **Evaluation of the sites.**
- **Priorisation concerning the different views of the project developer and the city department.**

The feasibility of this new tool will be tested on model sites in Stuttgart, which were already evaluated within the project "Sustainable Building Site Management in Stuttgart (NBS)". Although the tool was developed and will be tested in Stuttgart, it was created to be handled flexibly for the use in cities with other economic, environmental and social conditions. Therefore, the tool will be tested additionally in other cities to achieve a maximum flexibility concerning the given boundary conditions.

Introduction

The results presented in this article are part of the REFINA research project „small and medium-sized companies develop small and medium-sized sites" („SMC develop SMS"), which is aimed at the development of new, practice-oriented strategies and concepts for the revitalization of small and medium-sized urban brownfields. The aims of the research project can be defined as follows:

- The development and testing of concepts for the improvement of communication between local administration, small and medium-sized companies and site owners.
- The improvement and extension of strategies, concepts and techniques of SMC and municipalities during the redevelopment of SMS by development of a special management concept.

A sub-goal of the project is the development of an evaluation instrument for the selection of suitable sites, in order to test the formulated strategies and concepts on model sites. Against the background of these aims, up to now basic principles and approaches have been developed for the sub-goal. Furthermore, the basis was carried out for the development of an instrument, which enables local administrations to determine suitable types of future use and the suitability of sites in the municipality. The approach is stakeholder-oriented, with the investors being included in the evaluation process.

Project goals

The goal of this project was to carry out the basis for developing an instrument, which permits the evaluation of the potential of sites by selected criteria. In the

next step, a prioritization of sites is carried out in order to identify sites that might be successfully redeveloped. The instrument to be developed should incorporate the differing viewpoints of stakeholders (municipalities, investors) into the evaluation process and should permit the realistic evaluation of the redevelopment suitability of a particular size with regard to the site potentials and the competitiveness of the developed site.

With this approach, an attempt is made to determine the suitability of a brownfield site separately for both the target groups municipality and investor in order to achieve the highest possible total value of benefit. The weighting of criteria was undertaken by experts from municipalities and from investors with the help of decision-making software.

In order to establish a prioritization of sites, a three-phase model was developed. In the first phase, the suitability of each site is determined with the help of a criteria matrix, which serves for comparing the actual values (potentials) of a brownfield site with the target values for different end uses (residential, commerce, services, retail trade). In the second phase, the evaluation of the monetary value of contaminated sites is approached by using the end uses identified in phase 1 as basis for the calculation. The reasoning behind this method is that the potential value of a site after redevelopment can be determined by taking into account the contamination burden as well as the potential benefit due to the planned end use. From the processing of both phases and from discussions with experts, the criteria for evaluation and comparison of several sites were determined.

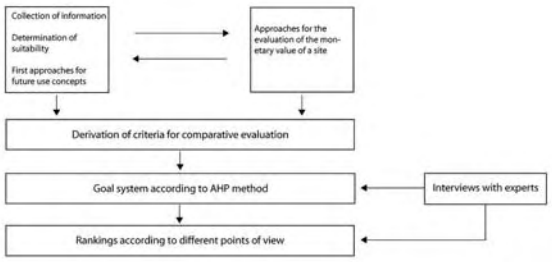

Figure 1: Process sequence for the evaluation of sites

The following figure shows the theoretical approach:

Phase 1: Determination of suitability for each particular site

Phase 2: Evaluation of sites

Phase 3: Technique for prioritization

The final compilation of criteria for site potential classification was prepared as checklist, which should assist the stakeholders with the comprehensive data collection necessary for the evaluation of development potentials of a site. Only after the evaluation of all sites, a prioritization/ grouping of the sites to be considered is carried out as the next step. For instance, studies aimed at the determination of brownfield site potential in Stuttgart showed that for more than three quarters of the identified potential area, a legally binding land use plan exists. However, this is not enough of an incentive by itself to generate investment into these areas. In order to carry out a ranking of the sites, criteria and indicators have to be derived, which would make a comparison of the sites feasible. During the project, it was attempted to bring the data for all sites to a comparable level in order to permit the prioritization planned for phase 3.

The determination of suitability in phase 1 was carried out in order to reach the following aims:

- Identification of the actual suitability of an area for a certain use,
- Improvement of communication with potential investors (What kind of land use would be possible with respect to the boundary conditions set in the land utilization plan or – if existing – the development plan?).

The knowledge acquired during the determination of suitability was prepared in the form of a site potential passport.

- Approaches for possible uses and first estimations of the monetary value of the site should be derived from results of the first phase.

- Furthermore, the basis for communication and negotiation with the site owner should be improved.

With the help of the results from the suitability determination (phase 1) and the rough value estimation (phase 2), a derivation and definition of criteria for phase 3 is carried out. These should permit the prioritization of a pool of brownfield sites according to the viewpoint of the municipality and the investors.

Determination of suitability

The approach for the determination of suitability is based on matching the site-specific requirements of different end uses with the site-specific potentials of brownfield sites. The evaluation technique selected was a combined method consisting of formalised approaches and an argumentative evaluation. A list of criteria was compiled, which is checked for each particular site. Concerning the reuse of a brownfield site as final aim, one or several possible future uses are identified by determination of their suitability for the particular site in question. Additionally, remarks and recommendations for action are given concerning the implementation process. In the first phase, the sites are assessed strictly with respect to their suitability. At the same time, comparability factors are collected in order to be used in the third phase. The following figure shows the fundamental idea on which the determination of suitability is based:

Figure 2: Fundamental idea for the determination of suitability

Site potential passport

The site potential passport is an instrument developed for this study, which provides on one hand a concise graphical presentation of the site-specific information, but which also describes the potentials of a particular brownfield site.

On the first page, fundamental information about each site is shown clearly arranged and supplemented with aerial photographs and pictures of the site. The data already collected from the city of Stuttgart was taken over. However, the site potential passport does not describe the actual situation according to building law only. In discussions with the planning department of the city of Stuttgart, possible future developments regarding building law were disputed and subsequently entered into the document as well. Additionally, information relevant for investors was included:

- Land uses in the vicinity (industries located on surrounding sites)

- Economic indices (spending power, central location)

- Remarks with respect to funding (credits, grants, city development areas)

The second page of the site potential passport shows an overview of the contamination situation, including site investigation and researches. Furthermore, the findings from phase 1 and 2 are shown summarily on this page. These include the results of the suitability determination and specifications concerning the future use. Additionally, the

results of the rough value estimation for remediation and – combined with this – an unbiased assessment of the monetary site value are given.

Approaches for monetary evaluation

Enquiries concerning the monetary evaluation of sites show that a suitable strategy for the realistic evaluation of monetary site value is still not available. As a consequence of the financial insecurity, banks refuse to finance projects in many cases. Very often, the determination of the initial value used in sale negotiations is also a source of conflict between the previous owner of the site and the potential buyer. Due to these potentials for conflict, it is very often necessary to employ a consultant commissioned by both parties. It is generally agreed that the remediation costs, the time period required for remediation and the potentially possible type of end use are factors, which have to be included in the evaluation process in order to achieve precise results. The approach developed in this study represents an attempt to overcome this major obstacle for the reactivation of brownfield sites and to supply stakeholders with a solution technique. A logical simplification of the problem leads to the development of the following equation:

$$MV_{AREAcont} = VR_{AREAuncont} - C_{Remed}$$

The parameter MVAREAcont represents the current market value of the contaminated site, VRAREAuncont represents the current market value of a fictitious, uncontaminated site and CRemed represents the costs for a remediation of the site in order to achieve a status, which would be comparable to the fictitious, uncontaminated site with regard to monetary value.

However, this approach, which is based on the comparison value method, harbours potential inaccuracy for two parameters of the equation. The determination of current market value for uncontaminated sites already poses the problem of different prices being paid for the same site, depending on boundary conditions. For this reason, Petersen (2005) remarks, that "already the parameter to be determined, the current market value, lacks satisfactory precision". For instance, it is assumed that an investor would be willing to pay the price of 500 €/m² for a suitable site, which has an area size of 900 m². However, if a site with an area of 1,300 m² is available in the vicinity, this does not mean that the price of 500 Euro/m², which would be used in the comparable value method, could also be got on the market. If brownfield sites with an area size of 5,000 to 10,000 m² are considered, incorporating the additional "unknown" contamination, it is clear that the variance will be significant. In practice, a deviation of up to 15 % from the true value is not detrimental for the determination of the current market value (Petersen 2005). A further, more significant unknown parameter is the determination of costs, which are necessary for the creation of a fictitious uncontaminated site, the remediation costs. For this parameter, the Sachverständigenbüro Dr. Ertel, Stuttgart, developed a calculation tool specially designed for planners and project managers, which predicts a rough cost budget based on existing investigations or on a first site inspection.

Instrument for cost prediction

The instrument for cost prediction – based on the program Excel – is conceived as supporting tool for project managers, urban planners or consultants for site evaluation, i.e. for "laymen in the field of subsurface remediation" (Manual Dr. Ertel 2006). This method should increase the reliability of decisions concerning contaminated sites by developing a rough cost prognosis. The specified level of detail corresponded exactly to the results aimed at in phase 2, i.e. the development of rough cost estimations for the sites in question, in order to supply a starting

point for the monetary evaluation. The instrument is subdivided into two separate process parts:

1. Site description and categorization

The analysis of the given fundamental data provides information about the risk potential of sites, which were used for commerce previously. This is done by letting the Excel tool calculate a parameter, which assesses the risk for the particular site. The following data has to be provided:

- size of the total area in question,
- size of the potentially contaminated area,
- location on the site,
- time period of use or previous use and evidence for contamination

2. Cost prediction

The cost prediction consists of four steps, for each of which a checklist has to be filled in:

- data collection on-site
- data analysis
- determination of data reliability
- Performance of cost prediction

The checklist is supplemented with a table containing average values of the mapped industries. The essential information for the processing can be found there.

Prioritization

The third phase defines criteria, which should permit a comparative evaluation of the analyzed sites. Therefore a list of criteria was compiled in order to compare the sites with regard to their reuse potential. The criteria were derived from the results of the suitability determination and from existing, completed projects such as "Sustainable Building Site Management in Stuttgart (NBS)". Additionally, several discussion sessions with project developers and contact persons of the city of Stuttgart took place, where the selection of criteria was disputed. The criteria were defined as success factors, which were used for comparison of the alternatives. A weighting of criteria was carried out from the viewpoint of investors as well as from the viewpoint of the municipality. The following criteria were chosen:

Availability

- Distribution of property ownership
- Prenegotiations
- Cooperation of owners

Urban planning

- Competing planning
- Strategic importance
- Contribution to urban development
- Willingness of municipality
- Consequential costs

Future use

- Site development expense depending on future use
- Planning laws/Advance planning
- Reliability of future use
- Consequential cost for infrastructure

Profitability

- Value enhancement
- Risk
- Possibilities for resale
- Location in urban redevelopment areas

Previous use

- Urgency of remediation
- Remediation expense
- Image

Analytic Hierarchy Process (AHP)

In order to make the different points of view and the significance of criteria measurable, a model from decision theory was applied – the analytic hierarchy process (AHP).

The AHP is a decision-making model developed by the mathematician Thomas Saaty in the 70ies of the 20th century. Among the different models in decision theory, the AHP is considered as a relatively simple one, which analyzes problems in reproducible way and is capable of preparing decisions. The AHP is described as an advanced cost-benefit analysis and is used for the solution of multi-criteria problems. However, there are significant deviations from the cost-benefit analysis. Those are (Schneeweiss 1991 cited according to Jacoby & Kistenmacher 1998):

- The number of alternatives has to be defined in the beginning.
- The problem is processed in a hierarchy of criteria and alternatives.
- The assessment of alternatives is carried out by paired comparison.
- In the beginning, the sub-goals are weighted in relation to each other. In the next step, they are weighted (again by paired comparison) related to the next higher level.

The AHP is used for the solving of multi-criteria problems. For the solving process, it is necessary to create a decision hierarchy, in which all criteria and alternatives necessary for the decision process have to be arranged in order. "The AHP structures the decision problem in levels, which correspond to the perception of the decision-maker; namely in aims, criteria, sub-criteria and alternatives" (Gutsche & Zimmermann 1991). With the help of an evaluation process it is determined, how important the hierarchy elements are in relation to each other. Afterwards, the alternatives are evaluated with respect to each single criterion. At first, the result of this process is the target fulfillment value, an approach for building an average based on the mathematical model of "eigen-value". After weighting of the criteria in relation to each other, weighting factors can be determined, with the help of which the sequence of alternatives is calculated.

Because of the paired comparison of only two criteria at a time, the weighting process is considerably simplified, which is considered the main advantage of the AHP. Thereby, a significant reduction of complexity can be achieved in this phase of the model. However, the determination of weighting factors from the paired comparisons by the „eigen-value" method requires an immense calculation effort due to the fact that for the aggregation pair comparison matrices have to be used. The mathematical principle of the AHP is based essentially on four axioms (Gutsche & Zimmermann 1991):

Axiom 1

If any two alternatives i and j are given from a finite dataset of alternatives, the decision-maker is able to give a value aij on a ratio scale for a comparison with respect to any criterion from the dataset C (containing all criteria). This axiom forms the basis of the pair comparison matrix. The meaning is that if for instance alternative i is five times more important than alternative j, then the reverse holds as well, i.e. alternative j is a fifth as important as alternative i (reciprocity).

Axiom 2

In a paired comparison, the decision-maker is never going to assess one alternative as infinitely better compared to another with respect to any criterion; in this case no decision problem is apparent and decision support would not be necessary.

Axiom 3

The decision problem can be described in the form of a hierarchy. This axiom is based on the following assumption: If a

decision problem can be subdivided into criteria, sub-criteria, alternatives and aims and if their relationships to each other can be marked off clearly, it is very probable, that these elements can be organized in a hierarchy. Furthermore, the paired comparison of two elements located on the same hierarchy level with regard to the next higher level, has to be independent of the evaluations in other, lower or higher hierarchy levels.

Axiom 4

Axiom 4 requests that all criteria and alternatives of the decision problem have to be represented in such a way, that they correspond to the conception of the decision-maker.

As the aim of this project, the prioritization of brownfields for reuse forms the decision problem. For the analysis, the problem was structured in decision elements, i.e. criteria and alternatives. The pool of alternatives is formed by the selected brownfield sites. For the weighting of decision elements, experts from each particular field were consulted, as it was assumed that the weighting is not known. The calculation of element priority with the "eigen-value" method was carried out with the software ExpertChoice. The software was also applied for the aggregation of element priorities in order to create a sequence of decision alternatives.

Weighting of criteria

The hierarchical classification of criteria depends on the subjective assessment of the decision-makers involved. Normally two different decision-makers would set up different hierarchies even with respect to the same decision problem, i.e. a hierarchy is not unequivocal (Meixner et al. 2004). For this reason, the weighting of criteria in phase 3 is carried out by experts independently of each other. In order to ensure comparable results, all experts are supplied with the same compilation of criteria. The weighting is carried out in 1-hour sessions as interview and with the help of the software ExpertChoice. During the sessions, all the paired comparisons necessary within the hierarchy structure are scanned. The AHP generally stipulates this approach in order to determine the significance of each hierarchy element compared to all others. The utilization of simple paired comparisons can be explained with human decision abilities. For cognitive reasons, humans are not able to compare more than 3 parameters with each other. The use of a paired comparison allows a reduction to only 2 elements to be compared (Meixner et al. 2004). In relation to this project, the experts do not have to evaluate the significance of profitability or urban development directly, but only their importance in relation to each other. The interview begins with comparing sub-criteria; subsequently the higher-ranking criteria are compared to each other.

For the weighting of the municipal point of view, three experts have been interviewed; for the investor's point of view, two experts have been interviewed.

Discussion of results

Applicability of the software ExpertChoice

The interviews carried out for the weighting of criteria were successful throughout and the criteria compilation used for the comparative evaluation of brownfields was approved by the experts. This ensures the plausibility and transparency of the criteria weighting process. Only two modifications were necessary:

From the viewpoint of investors, the criteria reliability of future use and possibilities of resale were equated in the interviews. For this reason, it is assumed that it suffices to include this sub-criterion only once in the compilation.

The handling of the sub-criterion prenegotiations proved problematic, as it is hard to measure or operationalize. Furthermore, it turned out to be difficult for

the interviewed experts to relate it to the criterion cooperation of owners and property ownership.

The stability of the weighting approach and with it the conclusiveness of the evaluation have been proven by the fact, that for no paired comparison the inconsistency factor was exceeded. With the help of the software ExpertChoice, decision factors for the reactivation of brownfields, which cannot be measured explicitly, have been made comparable. However, the preferences shown in the paired comparisons of criteria and alternatives are rather imprecise. Due to the use of a graphic user interface, the significance of elements in relation to each other was weighted only visually and not in absolute numbers. However, during the processing of the different sites it became apparent, that decisions usually have to be taken using estimated values, so that a graphic user surface is advantageous for deciding between two paired criteria.

The comparison of sites by means of the weighted criteria was carried out by resorting usually to the results compiled within the project. These were compared with the catalogue of weighted criteria for each particular site. An interesting option would be to carry out the paired comparisons of sites by experts as well. For instance, the five sites considered were quite similar with regard to the criterion urban planning. Probably the accuracy of the rankings could be heightened considerably, if representatives of the municipality would be deployed for the comparison of sites regarding sub-criteria such as willingness of the municipality or contribution to urban development. The same holds for the comparison of sites from the viewpoint of investors. In this case, the results would probably be changed as well, if the experts themselves could compare the site alternatives regarding sub-criteria such as risk aspects. Following the interviews, some of the experts were questioned regarding a comparison of the sites in question and attempted to compare them roughly with the weighting decisions in mind.

The instrument ExpertChoice provides a decisison-making function due to the logical structuring of the problem. However, it does not relieve decision-makers of their responsibility.

Suitability determination

The checklist for suitability determination enables decision-makers to get a comprehensive overview of the potentials of several brownfield sites in a short time. This makes it possible to determine the suitability of several sites at the same time with the formalized approach. Due to the modular character of the evaluation matrix, the approaches developed in this project can be used as a basis for the inventory and evaluation of brownfield sites potentials. The basic structure is flexible, so that a user-defined number of future uses and a number of differing weighting preferences can be introduced.

Therefore, the basic structure is generally transferable into a database system. A possibility within this option would be the individual adjustment of questions concerning the suitability determination and the weighting of criteria in relation to the problems to be solved, or the desired future use. Prerequisite for this is of course that the structure of the database follows the specifications of the checklist.

The contribution of the instrument to the determination of suitability in order to exactly describe suitable future uses is minor. However, for the development of a first future use concept, the processing of the checklist gives important starting points.

It has to be stressed, however, that the debates and discussions involved in the development of a concept cannot be substituted. For this reason, the potentials and possible future developments on a site were presented visually and argumentatively as well. For all analyzed sites, potential future uses could be identified.

The evaluation of monetary value following the suitability determination shows a way to incorporate these topics into the comparison of different sites. However, in the course of the project it became clear that only rough estimations of the monetary value development of a site can be achieved with this process.

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2.11 Former freight depot Bad Cannstatt - Strategies for clearance of explosive ordnance

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ABSTRACT

The premises of the former freight depot in Bad Cannstatt are to be restructured. The area was bombed several times by allied troops during World War II. In the course of efforts to revitalize this tract of land, the vestiges of these acts of war must be considered. Until now, systematic procedures for explosive ordnance disposal have only been used in individual cases. As a rule, large expanses of upper layers of soil are removed from the site and the explosive ordnance is removed. To avoid this costly measures a systematic procedure was developed. The first step was to set up 10 testing fields employing two different geophysical methods. The next step was to subdivide the area in question. Measures which are tailored to the individual sections prove purposeful for the task of targeted de-contamination On the basis of these results scenarios were drawn up to facilitate decision-making processes

Introduction

The premises of the former freight depot in Bad Cannstatt – like the entire municipal area of Stuttgart – were bombed by allied troups several times during World War II. In the course of efforts to revitalize this tract of land, the vestiges of these acts of war must be considered while also paying attention to hazardous ecological waste and zoning issues.

Dud bombs and other undetonated munition sometimes remain in the soil for decades, continuing to pose a hazard. Apart from the risk of spontaneous detonation or explosions provoked by improper handling (excavation or drilling), creeping environmental damage can occur caused by explosives which contaminate the soil and the groundwater.

In the interests of "healthy living and working conditions and the safety of the residential and the working population" [1], appropriate precautionary measures must be taken when potentially hazardous areas are built up again. Until now, systematic procedures for explosive ordnance disposal have only been used in individual cases. As a rule, large expanses of the upper soil layers are removed from the site and the explosive ordnance is sorted out. Using geophysical methods, disposal efforts can extend to relatively deep layers of soil which are not removed in the process. This guarantees almost 100-percent clearance of explosive ordnance, but such measures are particularly work-intensive and thus costly. In the case of contamination by hazardous ecological waste, the disposal of excavated soil and the delivery of replacement soil constitute additional costs. For this reason, explosive ordnance waste constitutes a considerable monetary obstacle for efforts to revitalize inner-city areas. If the area is not cleared,

the threat of explosive ordnance constitutes an imponderable risk for investors and in particular for the residential and working population in this area.

In the course of efforts to revitalize the freight depot in Bad Cannstatt, a systematic procedure was developed in consultation with the Explosive Ordnance Disposal Office of Baden-Württemberg (KMBD). The first step was to set up testing fields measuring 10 x 10 m and to use geophysical methods. In order to obtain the most representative overall results, the testing fields were distributed across the entire area. Apart from being useful for acquiring information on the underground, testing fields can be used to subdivide the area in question. Measures for disposing of explosive ordnance which are tailored to the individual sections prove purposeful for the task of targeted de-contamination.

Site description

The freight depot covers an area of 22 ha. The construction of the depot at the beginning of the 20th century constituted the first structural use of this tract, most of which was taken up by train tracks. Various depot buildings and storage sheds were built between the railway tracks and the loading ramps, some of them are still standing today. On area currently are about 70 buildings with a total surface area of approx. 51,200 m^2. Three active scrap recycling businesses, various warehouses, truckage companies, wholesalers, factories and one gas station are presently situated on this area.

The freight depot is located in the Neckar Valley some 400 m east of the river. A wide range of investigations of this site have yielded the following geological data. Underneath an approx. 2.5-meter deep anthropogenic filling consisting of cohesive soil and in part construction waste and scoriae, quaternary Neckar sedimentation is to be found. Underneath alluvial clay and river gravel from the Neckar at depths of approx. 7-8 m follow the mud- and siltstone of the Gipskeuper (km1). The first relevant groundwater storey is formed by the Neckar gravel. The average distance from ground level to the water table is approx. 3.6 m; the groundwater takes a west-northwestwardly course.

The freight depot was the target of several bombings during World War II. There is knowledge of several bomb strikes, which are documented in the City of Stuttgart's cartography. On the basis of available information it must be assumed that dud bombs constitute the main problem on the compound of the freight depot in Bad Cannstatt. Small pieces of ammunition from detonated ammunition trains and the like are not to be expected. Therefore on the basis of current information the search for explosive ordnance will focus on undetonated aircraft bombs.

Tasks performed

Investigation program

In consultation with the agencies involved the decision was made to include two geophysical investigative procedures in the investigation program:

- Magnetometer: iron detector model EL 1302A and EVA 2000; measurements to be performed by the KMBD, penetration depth approx. 5 m
- Electromagnetics: TDEM (Time-Domain Electromagnetic) procedures; measurements to be performed by Geohydraulik DATA, Mainz; penetration depth approx. 10 m.

The existing proportion of foreign materials in the anthropogenic filling puts limits on both systems. It will be necessary to ascertain the extent to which the systems are impaired by the metal parts in the landfill.

The following investigation program was carried out:

Establishment of 10 testing fields and measurements with various geophysi-

cal systems. The recommended measuring plane should be ascertained through stepwise penetration of the testing fields. At the same time, this procedure creates underground exposures which are representative for certain areas. This also provides information on potential contamination of the excavated material.

Testing fields

For the overall area of approx. 22 ha, 10 testing fields measuring 10 x 10 m were set up. Efforts were made to distribute them evenly over the surface. In selecting the fields, attention was paid to the existence of bomb craters, dud bombs and conduit and pipeline systems. The excavation work needed to establish the testing fields was performed by an earth-moving company. The services performed were to encompass the earth-moving work as well as the disposal of the excavated material and the refilling of the site. The testing fields were prepared for the measurements by removing the paved surface and the subgrade. In addition, the remains of all buildings and foundations were removed wherever possible The KMBD performed the precise positioning of the testing fields using GPS.

Then data were collected from these testing fields. After on-site evaluation by the KMBD the decision was made whether to excavate and collect data from additional layers or not (in increments of 0.5 m).

Measurements

Magnetometer

The measurements were taken by the KMBD using a Vallon differential magnetometer on Sept. 6 and 7, 2006. The model designation of the magnetometer is EL 1302A. The measurements were taken and evaluated using a Vallon field computer (VFC1) and evaluation software EVA2000. KMBD uses this system routinely to carry out explosive ordnance searches.

The measuring principle is as follows (as explained in the product description supplied by Vallon, Eningen, Germany): the magnetic field of the earth is homogenous in terms of field intensity and field intensity direction. If a ferromagnetic foreign body enters this homogenous field, the external magnetic field created by this body interferes with the local magnetic field of the earth. One speaks of a distortion of the earth's field. As the distance from the foreign body increases, the degree of distortion decreases.

The extent of the field distortion depends on several factors. The most significant are the size of the object which is to be located and its permeability. The larger the object is, the larger the distance is from which it can be located.

If the object is magnetized in the ground, i.e., if it has its own magnetic field, the lines of magnetic flux react in accordance with the polarity of the body. The north pole of the object repels the lines of the earth's field, whereas the south pole of the object attracts them.

The total interference is usually larger than that of objects which do not create an external magnetic field, but in rare cases it can be smaller, depending on the position of the object. This shows that with the help of a detector which enables one to identify distortions of the earth's field, which is essentially homogenous, it should be possible to track down hidden pieces of iron. A differential magnetic device for measuring field intensity is the preferred instrument for this task. In such a device, two magnetic field sensors are aligned geometrically at a prescribed distance from one another and connected electrically in such a way that the magnetic field intensity measured at the location of both sensors results in an output voltage of zero when the field intensity which impacts the location of both sensors is identical. This is the case in the homogenous earth's field. Distortions of the earth's magnetic field which are caused by the piece of iron which is to be located cause the magnetic fields which impact the locations of the two sensors to differ

in terms of magnitude and direction. In this case the measurement set-up creates a voltage which is proportional to the difference in field intensity. With the help of a field computer, the signals created by the voltage can be recorded and processed using evaluation software.

The measurement evaluation is performed by systematically traversing a surface at distances of 0.5 m (so-called SPUREN). Then the evaluation is performed using EVA2000, with the results being depicted on the field maps.

Electromagnetics: Measurements performed by Geohydraulik Data using TDEM

The geophysical measurements were taken using the Time-Domain Elektromagnetic (TDEM)-procedures developed by Geohydraulik Data GdbR, Körnerstr. 2, 55120 Mainz. On two days (Sept. 6 and 7) this procedure for detecting metal bodies and explosive ordnance was used alongside the procedure elucidated above. According to Geohydraulik Data, it is possible to detect potential dud bombs at depths of up to 10-15 m under ground level. One advantage cited is the minimal impact on foreign bodies located near the surface (construction waste, conductive topsoil, armed cement, pipelines and conduits, fences, etc.). On the other hand, high resolution is cited as a feature. The measuring principle is as follows (as stated in the brochure supplied by Geohydraulik Data): TDEM is a surface-geophysical deep sounding method. A TDEM system consists of a transmitter-receiver-coil (TRC), a control unit, which is needed to generate signals and record signal responses, as well as an integrated PC used to record and store data. During a TDEM investigation using a grid the vertical distribution of electric features in the underground are measured at every sounding point. The distribution of the receiver voltages is depicted within so-called time slices, which provide gauges for a relative depth assessment. Nearby metal bodies generate high, laterally limited voltages whereas metal bodies which are farther away as well as conductive parts of the underground generate medium-range voltages and undisturbed low-conduction areas generate weak voltages.

The signal generated by the control unit in the transmitter-receiver-coil generates a primary electromagnetic field which creates eddy currents in the underground. These in turn create a secondary electromagnetic field which is detected by the TRC. The intensity of the secondary electromagnetic field at any given time is dependent on the distribution of electric conductivity in the underground. With increasing time, the eddy currents extend deeper down into the underground as well as extending laterally, creating „smoking rings" in the process. Thus signals registered early map areas near the surface whereas signals registered later on generally map deeper areas.

In other words this means that the TDEM method generates a pulsed primary magnetic field via a transmitter cable (loop) which induces eddy currents in metal bodies located in the underground in particular. These in turn generate a secondary magnetic field which is measured as transient voltage in the same cable loop, which is now used as a receiver antenna. As time progresses, the increase in depth effect is registered.

A complete depth sounding with 32 transient voltage values was performed at each measuring point. The system employed, TDEM 2000 by BISON, is equipped with 32 channels with 96 time domains to choose from. The time needed for cyclic current turn-offs is less than one microsecond. The grid measurements were taken using a special indoor antenna. A one-meter grid was used, i.e., 100 measuring points were defined and measured per testing field. The results were also depicted on field maps.

Results

Unterground conditions

In all excavations, fillings consisting of cohesive soil were found near the surface. Such fillings usually have a low proportion of construction waste, brick and scoria and are identifiable as Keuper material, in part with chunks of red, gray and greenish sand-, silt- and mudstone.

Quaternary sedimentation was found at depths between 1.5 and 2.5 m. It consisted of muddy alluvial clay with varying proportions of organic substance.

Results of geophysical measurements

Results of measurements taken by the KMBD (magnetometer)

The KMBD documented their results as follows:

„On Sept. 6 and 7, 2006 a search using a gradiometer (i.e. a magnetometer; the author) was carried out on the abovenamed property by the Explosive Ordnance Disposal Agency on 10 predefined testing fields. The search was performed, evaluated and documented using computer assistance.

The search with gradiometer and the ensuing evaluation were impeded by foundations, pipelines and conduits, tracks, trackbed gravel and metal columns. The evaluation of the testing field yielded differing soundable depths. With the help of an excavator the testing fields were cleared of foreign bodies. No ammunition or parts of ammunition were found."

In correspondence to the results for the individual testing fields the boundaries of the so-called interference fields differ, which is to say, after the anthropogenic filling was removed it was possible and purposeful to sound out the depicted depths with a magnetometer.

Results of measurments taken by Geohydraulik Data (electromagnetics)

The results of measurements taken by Geohydraulik Data were reported as follows:

"The abnomalies which are to be attributed to metal objects visible on the surface were taken into account in the evaluation and are designated as such in the abnomaly plans. As concerns unknown object locations (UOL) in testing fields T3 and T2 the objects constitute relatively large metallic bodies at a medium depth (approx. 2-4 m under top ground surface). In the area of testing field T4 relatively large edaphic abnomal surfaces were identified. After the scoriaceous sediments in this area were removed, no further significant anomalies were found on the testing field. The UOLs in the area of testing field 10 are all small and near the surface. Thus all the other investigated areas can be considered free of any large metal bodies up to a depth of approx. 6 m under top ground surface."

After further targeted excavations the UOLs in testing field 2 were identifed as train tracks. The UOL in testing field 3 was revealed to be a cast-iron drainage pipe. In this case, as opposed to the measurements taken with the magnometer, the boundaries of the various interference fields are close to the surface with the exception of testing fields T1 and T3 (in correspondence to the prepared testing fields at depths of approx. 0.6-1 m). As Geohydraulik Data GbdR states, it would be possible to take measurements of the original surface while leaving the surface pavement intact.

Results of cleared testing field excavations

In Table 1 below, the excavations which resulted in the course of setting up the testing fields are depicted.

Table 1: Cleared excavation material

Value assignment in accordance with LAGA	Amount in [t]
Cement, uncontaminated	262.16
Asphalt, containing tar	107.81
Soil Z1.2	383.72
Soil Z2	780.0
Construction waste Z2	846.6
Trackage gravel >Z2	282.78

In correspondence to the assignment values in accordance with LAGA (Länderarbeitsgemeinschaft Abfall), only contaminated materials – with the exception of cement used for building foundations – were found. In particular, PAH substances were responsible for the contamination. Of secondary significance were heavy metals in relatively large concentrations.

Evaluation

Preliminary remarks

In correspondence to the standards set for healthy living and working conditions as laid down in German building law, appropriate precautionary measures must be taken when properties with potentially hazardous areas are built up again. Furthermore, when properties which carry the risk of containing explosive ordnance are sold, reduced monetary revenue is expected. This fact is founded on additional, albeit not precisely definable technical measures which prove necessary during the rebuilding process.

Therefore explosive ordnance clearance of properties for which higher-value usage is planned for the future constitutes a measure required by law to ensure a healthy living and working environment, a strategy to ensure that the property can be marketed advantageously and lastly, a measure which promotes such properties' valorization. Therefore in the case of the REVIT project the principle necessity for explosive ordnance clearance measures is undisputed.

There is knowledge of underground contamination on this area which, due to the long years of near-surface usage which has promoted contamination, encompasses a large surface area. Thus any intervention into the underground calls for excavations which usually cannot be replaced. The anticipated results are contaminated material which must be disposed of and the need for refilling with uncontaminated material.

This constitutes precisely the goals of the measures presented here: a procedure for detecting explosive ordnance in the underground is to be found which enables one to declare with relative reliability that the area in question is free of explosive ordnance while limiting the efforts (excavations) needed to achieve this. Moreover, the procedure should prove suitable in terms of the efforts needed for the actual measurements (expenditure of time, preparation of the surface, marginal conditions).

Evaluation of both measuring procedures

The efforts required to measure a certain area differ in terms of the two systems. The testing fields were measured using both methods on two consecutive days. The actual measurement-taking process takes three to five times as long when using the electromagnetic system as it does when the magnetometer system is employed. According to the KMBD, the daily capacity lies between 5,000 m2 and 10,000 m2 maximum, providing the measuring points have already been determined (manpower requirements: 2). When the electromagnetic system is used, a daily capacity of approx. 1,000 m2 is realistic (manpower requirements: 2).

The two methods in question are comparable in terms of conclusiveness, but in the case of the electromagnetic system limits are placed on the obtainable degree of resolution in regard to metal parts detection. In view of the case at hand, which involves the detection of relatively large

explosive ordnance, this disadvantage is insignificant. The overall accuracy of this method is lower than that of the magnetometer method, however.

On the other hand, the system employing electromagnetic measurements can be used for areas with sources of interference (for. ex. relatively large, laterally positioned metal parts near the surface, vestiges of building foundations, trackage gravel etc.). Measurements using the magnetometer are only conclusive if sources of interference are removed before the measuring process is performed. The obtained results are highly reliable, however. Thus measurements using the magnetometer call for more labor input, in this case earth-moving work necessary to perform the measurements, but they also elicit results with a higher degree of reliability and accuracy. In contrast, measurements using the electromagnetic system can easily be taken under current conditions while leaving the surface intact, albeit with certain limits being placed on their conclusiveness.

Conclusion

On the basis of the ascertained boundaries of interference fields (in this case in relation to magnetometer measurements) and current usage of the area in question, partial areas can be identified from which both kinds of information can be elicited, thus providing a basis for typization in connection with explosive ordnance clearance. The boundaries of interference fields determined within the testing fields have been transferred to larger areas.

Table 2:
Matrix for evaluation of both measuring procedures

Criterium	Magnetometer	Electromagnetics
Time expenditure for measurements	+	-
Necessary preparation (elimination of sources of interference / excavation)	-	+
Conclusiveness/ accuracy	+	0

When deriving the average excavation depths for the various types of surfaces the following factors were taken into account:

- The historical development of the surface
- Results of building fabric investigations for individual buildings in connection with demolition plans;
- Results of the investigation of the testing fields.

Six types of surfaces can be distinguished which can be characterized in terms of boundaries of interference fields. These interference fields representing the average excavation depths when using the magnetometer system. Ultimately, these features should be taken into account when making decisions as to which method is more suitable for the task at hand. Apart from types of surfaces which require only negligible efforts in preparation of geophysical measurements needed for explosive ordnance clearance, certain types of surfaces can be identified which, due to the existence of building structures or other far-reaching sources of interference, call for considerable efforts of this kind. The time and effort required also pertain to the high disposal costs.

Scenarios for explosive ordnance clearance

When the methods elucidated above and the types of surfaces which they are used for are considered in terms of individual scenarios for the explosive ordnance clearance of the area in question as a whole, the following assessment can be made:

It is evident that an explosive ordnance clearance of the entire area which guarantees a high degree of accuracy would

Table 3: Overview of scenarios

Scenario	Proportion of cleared surface area in [%]	Necessary excavation (approx.) in THSD [t]	Accuracy
1	100	690	Very high
2	80	274	Very high for some areas, moderate for others
3	60	469	Very high for some areas, uncertain for other
4	60	73	Moderate for some areas, uncertain for others

be connected with unreasonably large efforts. The costs incurred on the basis of the four scenarios depicted above lie between 2.1 Mill. Euro (Scenario 4) and 18 Mill. Euro (Scenario 1).

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2.12 Transformation of the former French military site "Buckenberg-Kaserne" into a new Pforzheim city quarter

Rüdiger Philipps, Oliver Lambrecht

ABSTRACT

The former French military site „Buckenberg-Kaserne" in Pforzheim will be transformed into a new city quarter for residential and working purposes.

In 1996 the French armed forces abandoned the site that comprises an area of approx. 200,000 m². Since 1996 some efforts were undertaken to reuse the property but these attempts of site transformation failed. This was due to the lack of comprehensive answers to the main questions:

a. **Type of future land use?**
b. **Complete removal or preservation of selected former military buildings?**
c. **Funding?**
d. **Costs of soil decontamination and demolition?**

In 2006 the „Konversionsgesellschaft Buckenberg" developed an integrated concept that considers all of the above mentioned aspects of site transformation. At present the basis for the projected demolition works is provided. In summer 2007 the transformation of the property starts with the initial phase of dismantling and demolition.

Subsequent to the development of retail business with a sales area of approx. 3,700 m² in the northern part of the site the coverage of the whole area with 300 apartment houses and buildings will be continued in 2008 and 2009.

Introduction

In December 2006 the Federal Agency for Real Estate Tasks sold the site of the former "Bucken-berg-Kaserne" to Konversionsgesellschaft Bucken-berg, a group of public and private investors. As major target the planned transformation of the site will combine living and working in a new Pforzheim city quarter.

In 2006 a Dutch consulting firm has developed a master plan concerning aspects like infrastructure, building development, biotopes and tree popula-tion. Although the original buildings from 1936 and 1937 are still under preservation order it is intended to remove all buildings except the "Old Armor and Blacksmith's shop" and the two guard-houses at the north entrance.

The development of the site commences with retail business in the northern area and will be com-pleted after construction of 300 apartment houses and buildings in 2008 and 2009.

Site Information

General site description

The former French armed forces site "Buckenberg-Kaserne" (French denomination: Quartier Burnol) is situated approx. 2 km southeast of D-75172 Pforzheim City Centre in the Federal State of Baden-Württemberg and lies on an average elevation of 385 m above sea level. The terraced surface declines in several steps from 400 m in the south to 376 m above sea level at the northern boundary (Fig. 1).

The site is located in a mixed residential and for-ested area. The closest residential premises are situated approx. 50 m to the north. Except for the slightly forested

Figure 1: General Plan of the site and surrounding

northwestern and southern border zones the area is mainly sealed by buildings, squares and streets.

The buildings surrounding the central square as well as the former horse stables and the armor and blacksmith shop were constructed in 1936 and 1937 and are still under preservation order.

Geology

The geological underground is formed by platy to massive fine sandstones and siltstones of Upper Buntsandstein. Only in the eastern part of the site the sandstones are covered by loamy or peaty sediments of small thickness. Within the property the surface is widespread modified by land fills and excavation of limited thickness.

Hydrogeology

The geology underlying the site is classified in general as an aquifer of low permeability, due to the geo hydraulic properties of Upper Buntsand-stein rocks. Dependent on precipitation the loamy soils overlying the rocks of Upper Buntsandstein tend to be easily waterlogged.

The underlying conglomerates and coarse sandstones of Middle Buntsandstein constitute the most important regional aquifer which produces large quantities of water for potable purposes. This main aquifer is used by the supplier company Stadtwerke Pforzheim which operates several wells in the Enz river valley within 2.5 km of the prop-erty. Therefore the site is located in a water pro-tection area classified as zone IIIB. In the vicinity of the site the confined water table of Middle Bunt-sandstein conglomerates will be encountered in a distance of > 50 m below ground surface.

Site history and historical land use

In 1998 an extensive review of historical maps and records was conducted. The results of the review report that the first buildings were constructed in 1936 and 1937. The barracks of the 3rd Battalion of 111 Infantries Regiment concluded housings for staff and soldiers as well as canteen kitchen (ca-sino), horse stables, blacksmith shop, gymnasium and a small bore shooting stand (Fig.2, Fig.3).

Figure 2: Former staff building (1936)

Figure 3: Former horse stable (1936)

After Second World War the barracks were occupied from 1945 to 1947 by American armed forces. In June 1951 the French 5th Armored Division moved into the site. Between 1951 an 1960 several new buildings for maintenance and repair of vehicles were constructed. Also a petrol station with 4 underground storage tanks was installed. In the southern and western area large buildings for maintenance purposes were constructed (Fig. 4).

Figure 4: Aerial Photo from 1980 – in the centre: French armed forces site, in the background: US-enclave

From 1961 to 1988 the southeastern part (so-called US enclave) of the site was used by the American 3/71 Air Defense Artillery Battalion.

Between 1960 and 1998 several incidents of sig-nificant environmental relevance occurred on the French as well as on the American property. Contaminations of soil resulted from inadequate handling and storage of operating supplies like diesel oil, fuel oil, petrol and lubricating oil. Site man-agement reported at least two significant spillages on site. Due to human failure in 1987 approx. 3,000 L fuel oil spilled out and polluted soil and drainage systems. The second significant spillage was reported in 1998 when 15,000 L fuel oil spilled out into the storm water system.

From 1990 to 1996 several selective remediation measures were performed by the geophysical branch of German Air forces support division. In this context contaminated soil was replaced in certain areas, e.g. washing plants or waste oil storage tanks.

As a result of the review it was strongly recom-mended to perform further investigations in 55 indicated areas where potential contaminations were suspected.

Assessment of environmental issues

Soil

From 1999 to 2001 the indicated 55 areas with suspected potential contamination were investi-gated in two steps.

In the first investigation step drillings or excava-tion pits were executed in all of the 55 indicated areas to gain and analyze soil and soil vapor samples. The aim of the first investigation step was to verify the suspected potential contamination for every single area. After the first step 7 areas were indicated with significant high contaminations of soil vapor and soil (Fig. 5).

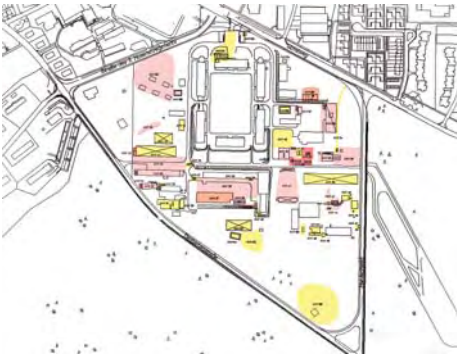

Figure 5: Overview of the investigated areas with potential contamination suspected

In the second step detailed investigations were conducted in the above mentioned 7 areas to estimate the lateral and vertical extension of con-taminations.

The results of the investigations reported that only limited remediation works will be needed to improve the environmental situation at places like three collecting points for used oil, the petrol station with

underground storage tanks and the tank maintenance area. In 2001 the costs for soil replacement and waste management were estimated from 150,000 to 170,000 Euro.

Groundwater

Based on available information from the historical review the environmental sensitivity of the site in relation to groundwater vulnerability was considered to be medium. But the presence of loamy and loess clay in addition to the less permeable Upper Buntsandstein rocks and a very low groundwater level (> 50 m) offers enough protection from any site-derived contamination especially against aliphatic and aromatic hydrocarbons.

This was proven by the results of groundwater monitoring after the oil spillages of 1987 and 1998.

Buildings and building materials

One of the major objectives of the integrated con-cept is to remove all buildings and installations except for three small units.

The aim of efficient deconstruction is to reduce the duration for dismantling on the site, to lower the costs, to improve the working conditions and to assure the required quality of the materials. Therefore results concerning the classification and composition of the future demolition waste should be generated in advance.

Based on documents of the buildings (construction plans, description and history) pre-deconstruction surveys - also called building audits - were performed in 2005 and 2006. During the audit indications of substances contained in the buildings, which may influence the quality of the materials or require special remediation works e.g. asbestos were collected and analyzed. In addition more than 80 drilling cores from walls and floors were obtained and analyzed according to the standards of German Länder Group Waste (LAGA).

In the former French area harmful substances like asbestos or tar roofing are very rarely contained in

the buildings. Also PCB or heavy metals play no role concerning the classification of demolition waste.

The volume of buildings to be deconstructed is calculated to 195,000 m³. From deconstruction of concrete and asphalt sealing of squares and streets should be obtained 7.000 m³ of demolition waste.

The results derived from the building audit showed that nearly 75 % of the demolition waste is to be classified as Z1.2 material. Only a small portion of approx. 15 % of the demolition waste will contain pollutants like hydrocarbons that classifies the material as Z 2 or > Z 2 (Fig. 6). Due to the fact that the site is situated in a water protection zone it is assumed that only a limited portion of demolition waste will be recycled on site mainly beneath public streets.

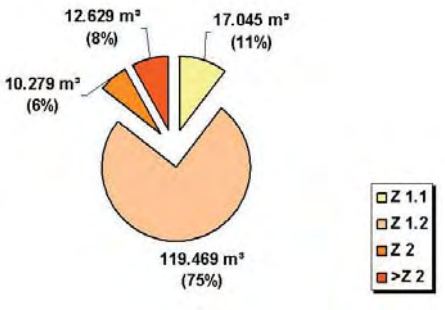

Figure 6: Result of building audit – demolition waste classification according LAGA

The costs for demolition of buildings and waste management, removal of old infrastructure like sewage and storm water systems were estimated to 2, 6 – 2, 8 Mio. Euro.

Integrated concept of site transformation

The integrated concept developed by Konversionsgesellschaft Buckenberg considers all aspects of a successful site transformation.

As the most important aspect the general future land use on the site was determined at first. A new Pforzheim city quarter with apartment houses and buildings will be created on the site of the former Buckenberg-Kaserne. Despite some of the older buildings are still under preservation order the participants took decision to remove all buildings except for the both guard houses and the old armor and blacksmith shop. These three units will be left as reminiscence of the former military site.

Due to the nearly complete removal of old build-ings and infrastructures it will be possible to create totally new alleys and streets (Fig. 7). Selected older trees and groups of trees will be preserved and integrated into the building development. An important role concerning the long term acceptance of the new city quarter plays the planned retail business at the northern boundary of the site. Therewith a nearby supply of the new residents is provided.

Figure 7: Model of the site development in 2008 and 2009 – foreground: the two guardhouses, background left from the centre: the old armour and blacksmith shop

In the past forty years the site of the Buckenberg-Kaserne frequently was related with negative environmental impacts. Therefore all aspects of contamination and decontamination should be handled with care. Thus it will be necessary to reveal all available information concerning environmental issues and remediation measures to the prospective buyers to assure a successful marketing of private properties.

As a result of the conducted historical review and the detailed field investigations the dimension of contaminations in the subsoil could be exactly determined. In opposition to the previously assumed large extent of soil contaminations the results of the investigation report now a manageable situation. The main part of costs for environmental is-sues will not be caused by remediation measures but by demolition works. In comparison to the costs for demolition works (2, 6 to 2, 8 Mio Euro) the remediation measures amount to only 5 - 7 % of the costs.

As mentioned above the most important aspects of transformation were previously resolved and merged in an integrated concept. Particularly the unsettled questions were answered concerning the future development, preservation order and costs for environmental issues. For this reason the project offers promising business conditions and will be supported by a group of local public and private investors.

It is scheduled that the demolition works will start in summer 2007. The development of retail business with a sales area of approx. 3,700 m² in the northern part of the site will be finished in 2008. Subsequently the coverage of the whole area with 300 apartment houses and buildings will be continued in 2008 and 2009.

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2.13 Airfield Böblingen/ Sindelfingen – Transformation of a former military site into a new city quarter

Karl Noé

Abstract

The transformation of the former airfield Böblingen/ Sindelfingen into a new city quarter is a very good example that under a positive collaboration of differ-ent parties brown-field redevelopment will be a success.

By revitalizing a former 80-hectares air-field, a new city quarter is being formed. This new quarter basically joins the two cities of Böblingen and Sindelfingen. It is planned to create a commercial and a residential as well as a large service area. The former airport buildings, which are protected as historic buildings, will be integrated into the project. It is estimated that approximately 10,000 new jobs will be created on the "air-field".

However, decades of military use have left their marks on the property's soil. Apart from "conventional" contaminations in the soil and groundwater, both unexploded bombs and other assorted types of explosive ordnance were expected in the ground.

Figure 1: Airfield Böblingen/ Sindelfingen

In order to estimate possible financial as well as liability risks, the two cities asked the engineering company ARCADIS to investigate the property with regard to explosive ordnance and contaminations. Based on the results of this investigation, a concept for the removal of the explosive ordnance as well as for ground re-

mediation was developed. With this concept and supported by expert advisers the two cities entered pur-chase negotiations with the "Bund" (German Federal Government), which resulted in the purchase of the property in 2002.

To facilitate the development of the former military site into a new city quarter, the cities founded the "Zweckverband Flugfeld"(Specific Administration Union Airfield).

This "Zweckverband" authorised ARCADIS with the preparation of a remediation plan in accordance to the soil protection law as well as a digital terrain model for the remediation, ground modelling, and preparation of land for buildings. In June 2003, the first demolition works were undertaken.

In spring 2004, the contaminated site clean-up, the removal of explosive ordnance as well as the large-scale ground modelling were begun with expert assistance from ARCADIS.

The first step for the ground remediation and modelling was the removal of a filling layer, which was up to four metres thick. Existing explosive ordnance was also removed. The excavated soil was stored in an interim storage facility and was analysed for contaminations. If the excavated soil had to be disposed of or could later be reused on site had to be decided on these analysis. A total of approximately 800,000 m³ of filling material were excavated. 700,000 m³ could be reused during the ground modelling.

After removal of the filling material, the natural ground was investigated for unexploded ordinance by using a geo-magnetic procedure. Any military munition detected was removed. The removal of military munitions was completed in May 2005. A total of 7 tons of military munitions (shell casings, hand grenades, tank ammunition) as well as 58 unexploded bombs from WW II were found.

After completion of the contaminated site clean-up and the removal of military munitions, the ground modelling was finished by the end of 2005.

Figure 2: Removal of filling layer

Figure 3: Removal of an unexploded bomb

Figure 4: Removal of an unexploded bomb

In spring of 2006, the development of high-priority development sections was begun, so that in early 2007 the first fully developed parcels will be available to interested users and investors.

Figure 5: New city quarter

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2.14 Exploring Ways to Evaluate the Benefits of Well Designed, Well Maintained Open Space in England

Sandy Tomkins, Kate Millar, Paul Nathanail

ABSTRACT

Recent studies have demonstrated the value of well-designed and maintained open space in providing opportunities for social interaction and for individual development through physical activity and recreation. In addition, local economies benefit through enhanced inward investment and increases in property values, and greater commercial confidence. There is only limited evidence showing measurable let alone financially quantifiable benefits.

Preliminary work is exploring the use of performance indicators (PIs) to estimate direct economic benefits. Using 'Environmental Education' as an example, this paper highlights how a number of measures can be applied to value an open space site as an outdoor classroom. A conversion factor can be used to estimate value, but any conversion factors used would need to be cautious and defensible. The methods for measuring the Environmental Education PI need further reflection and development. In order to ensure accurate assessment, effective recording and reporting mechanisms would need to be introduced for any proposed PI.

Introduction

Many organisations use the terms open / green space interchangeably, however the most suitable definition is given in Planning Policy Guidance 17: Planning for Open Space Sport and Recreation (ODPM, 2002), which states that open space should mean all spaces that are of public value including not just land, but also areas of water such as rivers, canals, lakes and reservoirs which offer important opportunities for sport and recreation and can also act as a visual amenity. The broad range of open spaces that may be of public value include: parks and gardens; woodlands, urban forestry; green corridors; outdoor sports facilities; informal recreation spaces; play areas; allotments, community gardens, and city (urban) farms; cemeteries and churchyards; accessible countryside in urban fringe areas; and civic spaces, including civic and market squares, and other hard surfaced areas designed for pedestrians.

The benefits conferred by high quality open space are widely recognised and recent studies have highlighted the value to society of well-designed and maintained open space (e.g. DCLG, 2006; NAO/ ODPM, 2006; CABE Space, 2004; Land

Figure 1: Chinese Delegation Visiting the Grasmoor Country Park Development, Derbyshire

Use Consultants, 2004; English Nature, 2003a). Although many Local Authorities recognised the importance of open spaces as a valuable public amenity, for over two decades limited resources were made available for development and maintenance due to the competing budgetary demands of other key services (i.e. healthcare) and a lack of financial and political support from central government (NAO/ODPM, 2006).

Recognising the significance of the decline in UK's open space, the UK Government initiated a number of policy changes and established the Urban Green Space Taskforce in 2001 (NAO/ODPM, 2006). In 2002, it proposed a series of priorities for revitalising the provision and long-term maintenance of open space areas and in 2003 the Office of the Deputy Prime Minister set up the organisation CABE Space to act as the champion of green space.

CABE Space's 'Wasted Space?' campaign (http://www.wastedspace.org.uk/) revealed that open space in all its various forms – streets, squares, parks and gardens – continues to be undervalued as a public amenity. Due to lack of investment, badly designed and managed open spaces are often in the most deprived urban areas and therefore fail to improve the quality of life for the local people (CABE Space, 2004). In fact, badly maintained open spaces only intensify the sense of physical and social degeneration in an area. It has been claimed that neglected parks for instance seem to attract anti-social behaviour, which in turn discourages other members of the community, creating isolated no-go areas that people are scared to visit (CABE space 2005a)

Where restoration projects are being carried out, it is essential to make sure that good-quality outdoor spaces are not sacrificed for the sake of higher density housing. In fact, the higher the concentration of housing, the greater the need is for well designed and managed public open spaces, in order to create a community where people would want to live and work (CABE Space, 2004).

However, in any investment appraisal it is difficult to balance the economic costs of open space provision with non-monetary benefits. Therefore in order to explore the feasibility of financially quantifying the socio environmental benefits of open space, it is necessary to examine and describe these ''benefits" in more detail.

Social Value of Open Space

The types of social benefits open space provides include: (i) parks and open space areas which can function as outdoor classrooms by providing outdoor environmental awareness classes for children of all ages; (ii) open space can also improve the health status of local communities through increased participation in outdoor exercise (e.g. green gyms); (iii) open space provides stimulation, entertainment and learning; (iv) open space can neutralise the consequences of high density development; (v) open space can foster an understanding of and appreciation for the natural environment; (vi) open space can maintain the link between people and natural cycles of seasons.

Open space can also play a role in changing individual lifestyles, such as reducing anti-social behaviour and altering sedentary behaviour, thereby improving the overall quality of life for local communities. The provision of open space, in particular green space, can improve mood through increased contact with enriched natural environments (CABE Space, 2005a; Reynolds, 2002).

In an attempt to improve open space provision, several local authorities have recently invested in developing industrial sites (brownfield land). For example, country parks have been developed on several former coal mines in the East Midlands of England. These are now seen as international examples of open space reuse of post-industrial land (Figure 1). However, there is still only partial and often anecdotal data to demonstrate their

financial value. Environmental Impact Assessments (EIA) have highlighted environmental benefits, but economic assessments are still limited.

Environmental Benefits of Open Space

Open space plays an important role in improving the urban environment and local residents' quality of life by helping to reduce pollution levels and maintaining biodiversity. Trees and vegetation in open spaces improve the quality of the air by removing carbon dioxide and replacing it with oxygen and have significant capacity to absorb carbon monoxide from cars. In particular, they act as filters, reducing the levels of pollutants such as sulphur dioxide and nitrogen oxide in the atmosphere (NAO/ODPM, 2006).

Open spaces benefit biodiversity by providing a wide variety of landscapes; improving the appearance of the environment; and providing habitats for many birds, animals, wildflowers and trees. Green open spaces can act as wildlife corridors that encourage particular species to spread); can reduce flooding and play a major role in drainage; they can be converted to provide allotments and community gardens and give people the opportunity to get involved in nature (Belfast City Council, 2005).

Contributors to a survey conducted by CABE Space (2005a) strongly felt that a decline in the quality of open space contributes to the onset or increase of vandalism, anti-social behaviour and even serious crime. Neglected parks for instance seem to attract anti-social behaviour, which in turn discourages other members of the community, creating isolated areas that people are scared to visit. In Parks and Squares: Who Cares? (2005c), CABE Space reported that the public most disliked green spaces not being kept clean or safe, poor standards of maintenance are highly visible to the public and communicate a lack of care and authority.

The importance of green space in urban areas and the peri-urban fringe is increasingly discussed in terms of its provision of an overall area of high quality land that is within accessible distant for all households (English Nature, 2003a; ODPM, 2002; Scottish Executive Social Research, 2005) and the role these areas play in maintaining and increasing biodiversity (CABE Space, 2006; English Nature, 2003a).

Quantifying the financial benefits of these two key environmental areas is a challenging research area, as many of the benefits gained for these two dimensions (viz green space as an amenity and as a natural habitat) are intrinsic or confer secondary and tertiary benefits. However, correlation can be made between public policy, intrinsic value and an economic conversion that relates to provision costs.

Economic Value of Open Space

High quality open space can have a considerable impact on the surrounding local economy and is an essential part of any successful regeneration strategy. The impact on regional economic regeneration of converting derelict or rundown industrial sites into quality open space, has been a widely discussed issue across Europe (e.g. www.cabernet.org.uk). A number of studies have examined localised benefits in terms of house prices, direct job creation and new business start-ups (Ernst and Young, 2003; CABE Space, 2004). A number of key economic areas emerge that relate to the establishment and quality maintenance of specific parks, these are: (i) the influence that open space has on local employment through the provision of directly-related jobs and (ii) the impact on property values for houses.

CABE Space (2005b) assessed the impact of renovated and newly created green spaces on property valuations. The study showed that the provision of green space can increase on average the value of properties surrounding the new area by between 5-7%, as house buyers are

willing to pay to be near green space. Property value increases could eventually translate into increased local council revenue through eventual re-valuation of the properties and amendments to Council Tax rates.

The presence of well designed and maintained parks, gardens and other open spaces attracts private sector investment, while in town centres a pleasant environment increases the number of people visiting retail areas. The local economy also benefits from increased house prices (CABE Space, 2004).

The Challenge of Financially Quantifying Benefits

Few studies systematically quantify or financially audit the benefits of open space. Greater understanding of the 'value' of open space on all levels will help target resources so that current improvements can be extended and sustained. The limited evidence means that it is hard to directly quantify, let alone value many social, environmental and economic benefits of well-designed and maintained open space. This in turn makes it hard to justify investment and the inclusion of high quality open space in urban regeneration programmes. The inclusion of open space in land use plans although acknowledged as important, can be hard to justify as the financial benefits of new and often costly programmes is still disputed.

A key issue when discussing the benefits of open space therefore is the ability to financially quantify if not all, at least some of the specific aspects of the 'value' of providing open space. Although benefits, such as those described in the sections above, have been recorded and reported, a limited amount of work has been conducted to correlate these 'positive outcomes' with quantitative Performance Indicators (PIs), which can be used to measure the 'success' of an organisation.

Performance Indicators

Performance Indicators (PIs) are quantifiable measurements that reflect the operational efficacy of an organisation. For example a DTLR report (2002b) on Use of Local Performance Indicators defined PIs as "a form of measurement developed/ adopted and reported by the local authority in order to assess and guide its performance" (DTLR, 2002b). They are increasingly used by both public and private sector organisations who wish to measure performance in order to improve their operational activities, demonstrate any improvements, and show value for money.

In terms of open space management, performance indicators are applied internally by a number of organisations, such as the Groundwork Trusts, and national targets and indicators have been set which aim to help bring about and track improvement (NAO/ODPM, 2006). Groundwork appointed the Centre for Local Economic Strategies to undertake regular impact assessments of all Groundwork Trusts. The first pilot evaluations concluded that they are having a beneficial impact "on neighbourhood satisfaction, liveability, fear of crime, skills development and community empowerment" (Groundwork, 2006). In April 2005 the Office of the Deputy Prime Minister (ODPM) in association with a number of other government departments, introduced a number of Public Service Agreement (PSA) targets to track and measure improvements in green space quality. Within a broader aim to enhance 'liveability' – improving the quality and safety of open spaces and local environments and people's enjoyment of them – the Government set national targets under the eighth Public Service Agreement of the ODPM.

PSA Target 8 – Liveability requires "the delivery of cleaner, safer, greener public spaces and improvement of the quality of the built environment in deprived areas and across the country, with measurable improvement by 2008" (DCLG, 2005). Specifically under PSA 8, two targets di-

rectly relate to green space management, these are: (i) "To increase the percentage of residents satisfied with local parks and open spaces by four percentage points nationally, and by six percentage points overall for residents living in local authority districts in receipt of Neighbourhood Renewal Funds, above the baseline year 2003-04". and (ii) "Increase to 60 per cent the proportion of local authority districts nationally, and to 60 per cent the proportion of local authority districts in receipt of Neighbourhood Renewal Funds, with at least one park or green space that meets Green Flag Award standard" (NAO/ODPM, 2006)

The Green Flag Award, established to recognise good practice in green space management, assesses the quality of parks on the basis of eight criteria. Specifically, a park should be: welcoming; healthy, safe and secure; well maintained and clean and managed in a sustainable way. In addition the management of the park should make the most of its conservation and heritage potential; encourage community involvement; actively market the park and have a strong management plan in place to set out the priorities for the park. The management plan should make the most of partners' involvement, have a realistic time scale and show how the park will contribute to the neighbourhood as a whole. It should demonstrate good financial management and be regularly updated (NAO/ODPM 2006).

Schemes such as The Green Flag Award and other internal performance review systems allow both the managers of open space and the public to follow improvements in performance and value for money.

The key issue however, is whether it is possible to develop PIs which could be used to financially quantify, monitor and report open space derived benefits. The following section explores this dimension by examining the 'Environmental Education' benefits derived from the delivery of well-designed and maintained open space.

Defining Performance Indicators for the Evaluation of Open Space Provision

Community involvement in the maintenance of a park area, through formal and informal groups, and its use through numerous leisure and educational activities can improve social inclusion, community cohesion and encourage cross-community activities (ODPM, 2002).

Open space can play an important role as an educational resource, not only for children but also for adults, as a mechanism for stimulating life-long learning relating to the effects of human interaction and its impact on nature and the wider environment (DTLR, 2002a).

When the social benefits of open space are examined in more detail a number of key areas emerge. Community scale benefits relate to three specific issues: involvement in the planning and ongoing maintenance of open space can improve community cohesion and wider engagement; open space as an 'outdoor' classroom; and the positive impact that well maintained open space can have on anti-social behaviour.

8. Environmental Education – A Potential Performance Indicator

Before analysing how Environmental Education could be used to measure and then be converted to an annual financial value, it is useful to explore the governmental and public organisations involved in providing and facilitating the provision of environmental education.

Outdoor learning through interaction with the natural environment is an important and valuable educational tool. Walks through the park form part of the primary school curriculum. Such learning encourages greater understanding of the links between rural and urban environments, informs children on how food is produced and highlights the importance of the UK countryside (including its fauna

and flora) for sustaining livelihoods. There is increasing concern that children are becoming more and more distant from nature and the countryside. This form of learning experience, interacting with the natural environment, is particularly important for inner city school pupils who have little or no exposure to rural areas or green space.

Department for Education and Skills

In 2005, acknowledging the educational importance of interaction with the natural environment, the Department for Education and Skills (DfES) launched the draft 'Education Outside the Classroom' Manifesto, which promoted the value of outside or outdoor learning (DfES, 2006). Through multi-stakeholder involvement, the proposed programme aimed to further stimulate use of outdoor resources, such as green space, for educational purposes. A consultation was concluded in February 2006 (The consultation states:

"The main aim is to provide all children and young people aged 3-19 with a variety of high quality learning experiences outside a classroom environment, whether during school, after school or during holidays … No decisions have been taken on policy options ….. The Manifesto vision will only be realised through schools and supporting stakeholders coming together to make sure that all children and young people have the opportunities provided by education outside the classroom. Government has a role to play, and will be offering its own pledges for the Manifesto" (DfES, 2006).

Learning through Landscapes

Learning through Landscapes (LTL) is the UK National School Grounds Charity. Since 1990, LTL's aim has been to "help thousands of schools with poor grounds transform these both for teaching and learning across the curriculum and for children's all round health and development". There is often little money available for this work, so the Trust's key mission is to help schools access new resources and skills with the full involvement of children, teachers and the wider school community. LTL believes "that learning and playing outside are essential to every child's development and by improving outdoor spaces in education and childcare a real difference can be made".

In addition to educational benefits, pupils exposed to stimulating and high quality outdoor spaces show marked behavioural improvements. An LTL National School Grounds survey of 700 schools and 'early years settings' reported on the positive effects of improving school outdoor spaces. The study showed the incidence of bullying was reduced by 64%; pupil behaviour improved by 73%; attitudes towards learning improved by 65% and there was 84% better social interaction (Learning through Landscapes, 2003).

Growing Schools

Growing Schools is a UK government information portal which aims to encourage and inspire all schools (nursery, primary, secondary and special) to use the outdoor classroom as a context for learning across the curriculum. It focuses in particular on food, farming and the countryside, on ensuring pupils are given first hand experience of the natural world around them and on integrating outdoor learning activities into every day teaching practices.

Over 15,000 schools participate in activities, request resources and advice on the 'outdoor classroom' teaching.

The role that outdoor learning plays is acknowledged in the National Curriculum and as a result programmes such as Growing Schools have been established to help teachers use the 'outdoor classroom' more effectively. Demonstrating the range of learning opportunities, Growing Schools have listed 12 subjects (Science, History, English, Art and Design, etc) that can use 'outdoor classrooms' to teach elements of the national curriculum (Ref). (www.teachernet.gov.uk/growingschools/

support/detail.cfm?id=13).

Application and Operational Aspects of Performance Indicators

Environmental Education was chosen as a case study to explore whether it is possible to apply an annual economic value to this benefit, as one of the benefits that is conferred when either a high quality open space is renovated or established.

In terms of operational aspects, PIs are presented as a clear time series and it is essential to ensure that the same definition is applied from year to year. It is also important to clearly define units, measurement conditions and timescales. Once the PI has been defined, periodic targets need to be set, and clear measurement standards need to be established that are verifiable and auditable. The specified target needs to be clear so that specific action can be taken to accomplish the pre-defined target.

In order to translate the benefit of Environmental Education to a potential measurable PI that can then be converted to a financial outcome, the following table sets out a structure for the PI.

Conclusions

Although the benefits conferred by well-designed and maintained open space are widely acknowledged there is still limited evidence that can quantify the benefits or relate them to a financial benefit.

This paper has explored preliminary work that is attempting to demonstrate by the use of a performance indicator an option for estimating the direct economic benefits.

Using 'Environmental Education' as an example, highlights how a number of measures can be applied to estimate the economic value of utilising an open space site as an outdoor classroom.

Table 1 Performance Indicator on the Environmental Education Benefits of Open Space

Definition: The Use of Open Space as an Outdoor Classroom
Target: To increase young peoples' access to and understanding of the natural environment
Time Series: Annual measure of organised visits at a given site
Measure of data: Number of school pupil visits (schools and pupils) for activities within the National Curriculum – e.g. for pond dipping, nature trails, etc
Performance Level: Number of school pupil visits (number of schools and pupils)
Measured Performance and Economic Conversion **Measure:** The interaction of pupils with an open space site can be quantified and qualified in a number of ways. As well as being applicable for use across a wide range of subjects, open space, particularly green space can be used as an 'Outdoor Classroom' for all ages (Nursery, Primary, Secondary and Special Needs School Children). Measures of utilisation of the site and types of activities can include: a) Number of pupils per visit (including school year, ages, gender) b) Number of school visits (number of schools, distant travelled, school districts) c) Type of visit (Activity involved, related UK National Curriculum subject) d) Number of days involving school visits (number of visits each month, number of working days involving school visits) e) Teachers' and pupils' survey of the value of the visit (e.g. how interesting, links to the National Curriculum, accessibility, amenities for schools, general feedback from teachers and pupils that have used the sites) In order to promote a site, open space managers could proactively link to or create partnerships with Outdoor Education Organisations (e.g. UK programmes such as: DfES programmes, Charities, Trusts, etc). These activities could be measured: f) Numbers of Website links from 'outdoor education' organisations g) Number of formal partners h) Number of educational-related grants associated with the site (e.g. to improve trails or produce reading material) **Economic Conversion factor:** As with so many benefits that relate to the use of open space, although the significance of outdoor learning is widely recognised there are very few economic assessments of educational value. One option for estimating the direct economic costs could be through individual visit costs per pupil and the economic value of the teaching contribution of on-site staff. This could be calculated by assuming the target number of school pupils was 50 per month for each site visit at 6 euro per visit = 300 euro. For an organisation managing 10 sites that would equate to 3,000 euro per month. For 300 pupils per month @ 6 euro per visit, the economic benefit per annum equates to 216,000 euro for ten sites. Teaching staff supervision or ranger led activities in a park where sessions might last for approximately 1 hour might cost between 40 to 60 euro for groups of up to 35 children. This could equate to an economic value of between 4,000 to 6,000 euro per annum for 350 children visiting 10 sites.

A conversion factor can be used to estimate value, but any conversion factors used would need to be cautious and defensible. The methods for measuring the Environmental Education PI needs further reflection and developed. In order to ensure accurate assessment, effective recording and reporting mechanisms would need to be introduced for the PI.

It is possible to demonstrate economic value for a number of PIs gained from a wide range of benefits conferred by open space. Further work is needed to define the measurements, economic conversion and the caveats of any reporting system.

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3

Sustainability Context and Citizen Involvement

3.1 Sustainable Regional Land Resource Management

Robert Holländer, Enrico Thomas, Anja Brandl, Oliver Rottmann, Christian Winkler, Sabine Lautenschläger

ABSTRACT

The article will outline the scope and current status of a research project funded by the German Federal Environmental Agency (UBA) and Deutsche Bahn AG (DB AG - German Railway Company). Scope of the project "Sustainable Regional Land Resource Management" is the investigation of development options for a number of selected brownfields and alternative greenfield sites in two pilot regions in Germany. The brownfields are owned by DB AG. The pilot region Leipzig-Halle was selected to represent a region with rather little economic activity and Karlsruhe as an example for a more prospering region. Overall objective of the work is to identify a framework of action for private, municipal, regional and national stakeholders to bring brownfields back to beneficial use through reintegration into the property market. The project is divided into three subprojects: spatial planning analysis (I), economic analysis (II), and environmental analysis (III). The first step of subprojects I and II is to identify feasible land uses for inner-city brownfields in both pilot regions on the basis of their regional economic, demographic and municipal development. Subsequently, these land uses are compared with land reclamation in greenfields in regard to their economic impacts on the stakeholders affected. In subproject III, the environmental impacts of the land use decisions in inner-city brownfields are compared with the respective impacts of greenfield developments.

Introduction

In 2002, the German government set the target to reduce land consumption through settlement and traffic from currently 115 ha/day (StaBa 2006) to

30 ha per day by the year 2020 within its national strategy on sustainability (Bundesregierung 2002). The redevelopment and reuse of brownfields has been identified as a major tool to achieve this goal. Today, brownfields in urban areas are estimated to constitute an area of 139.000 ha. Inner-city brownfields of the DB AG (German Railway Company) are of particular interest because these sites are usually characterised by good traffic connections and an existing municipal infrastructure. The non-operating property of the DB AG comprises an area of approx. 26.000 ha and is representative of the major share of privately owned waste lands.

Problem Statement

With changes in the economic structure of a region, the relocation or disappearance of entire industries and the streamlining of productivity, private and public owners or former users of properties withdrew because further commercial use of the areas did not seem to be possible. Due to sometimes unattractive locations and/or soil contamination in consequence of previous uses, the areas cannot immediately be made available for new uses. Costs for land development and preparation for uses are often disproportionate to the expected return. However, the reuse of brownfields represents a key to implementing the aims of the sustainability policy of the German government.

Irrespective of the characteristics of a brownfield site, an economic use is always subject to the economic structure of the region. In economically prosper-

ing regions that are scarce in sites to be developed, reactivating brownfield sites provide an opportunity to increase the insufficient pool of inner-city properties. In less prosperous regions, however, an oversupply of brownfield sites to be potentially developed can lead to competing areas and consequently to competing types of brownfield developments. Therefore, avoiding such interferences is part of the problems associated with brownfield sites in addition to an economically, ecologically and socially acceptable development of the sites.

Study Objective

Taking brownfield sites of DB AG as an example, it is to be demonstrated how revitalisation of sites takes place so that a reduction of land reclamation can be achieved by reusing brownfield sites for the collective good. Overall objective of the project is to identify a framework of action for private, municipal, regional and national stakeholders to bring brownfields back to beneficial use by reintegrating such land into the property market.

The working group develops approaches for possible land reuse models by analysing brownfield sites of the DB AG spatially, economically and ecologically. Structural transformation processes and their consequences are to be taken into account as well as economic aspects regarding the management of property treatment, legal aspects and aspects of urban development. Studies are carried out in two structurally different regions of Germany according to the type of location, respectively.

The project is funded by the German Federal Environmental Agency (UBA) and DB AG.

The research project constitutes an interdisciplinary teamwork of departments of Leipzig University and Stadtwerke Düsseldorf, as there are:

- Institute for Infrastructure and Resources Management,
- Department of Urban Development and Construction Management,
- Department of Finance,
- Department of Real Estate Management and
- Stadtwerke Düsseldorf AG, Department for Brownfield Redevelopment.

Assessment of Land Use Decisions

The research project is divided into three subprojects:

- Spatial analysis (subproject I)
- Economic analysis (subproject II)
- Environmental analysis (subproject III).

The research results of these subprojects are combined in a concluding overall social evaluation.

Economic and environmental analyses were carried out on the basis of a proposed reuse for each of the 8 examples of brownfield sites located in the regions Leipzig-Halle (East Germany) and Karlsruhe (West Germany).

The following paragraph describes the selection of model sites as well as the development of a proposed reuse for a model site. A detailed economic and environmental evaluation follows.

Spatial Analysis

The two model regions Leipzig-Halle and Karlsruhe were individually characterized by means of a situation and development analysis on regional and local scale. This was done using a traditional location analysis that is very common in urban planning and real estate management.

The first step within subproject I was to analyse secondary data (e.g. data from the German Federal Statistical Office, the Statistical Office of the Free State of Saxony, the Statistical Offices of Saxony-Anhalt and Baden-Württemberg, the Regional Planning Report 2005, the Bertelsmann Foundation, the Population Forecast 2020). As a result of this analysis, five types of location with different spatial, demographic and economic conditions could be identified in these model regions. In addition, particularities of the regions were identified which need to be considered in the creation of a unique selling proposition for the future use of brownfield sites.

In the next step, one site was selected for each location type in both regions. The selection included a pre-selection of the sites (on the basis of a fixed list of criteria, e.g. size and shape of the sites) using the DB AG PAS (Portfolio Analysis System), followed by an evaluation through on-site analysis. The final selection of the sites was supported by a scoring model. The scoring model consisted of data concerning the land, location as well as the current market situation. In conclusion, a diverse portfolio of brownfield sites was created representing the current situation in both model regions.

The process of establishing an adequate reuse proposal for a brownfield site, included consideration of formal and informal regulations (e.g. state and regional development plans) as well as determination of urban planning potentials of the sites (via micro analysis and on-site analysis). Especially superordinate demands were taken into account in order to ensure a sustainable reuse (e.g. adaptation to transformational processes in society, strengthening the economic potential of the community, long-term perspectives). These criteria were not only fulfilled by using quantitative methods but also by using qualitative methods (assessments and derivations), which are very common in urban planning processes.

The next step constituted evaluations of the current and potential use of each brownfield site. Potential uses were structured according to the function of the sites, e.g. residence, work, leisure and recreation, and the spatial level in which the use might be relevant (town, neighbourhood).

As a result of the process described above, a decision on one potential use for each brownfield site was made.

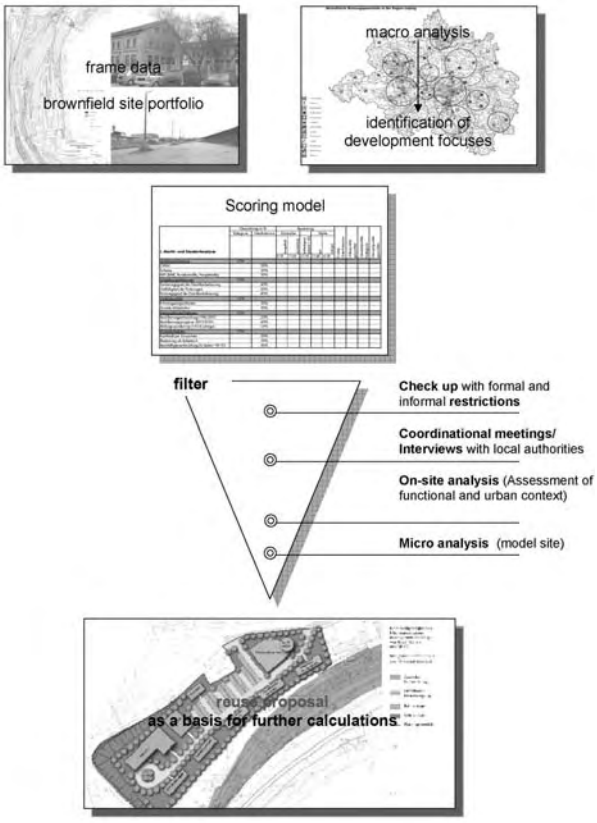

Figure 1: Methodology Spatial Analysis

Economic Evaluation of Reuse Proposals

In subproject II, (economic analysis) the general framework and the consequences of land reclamation of brownfield sites were analysed. Subproject II is divided into the following steps:

- Investment calculations for the reuse proposals
- Respective costs and benefits for the stakeholders owner, investor and local authority
- Effects of financial support and subsidies

Investment calculations were carried out for the verified reuse proposal using the investment calculation tool „RES invest" (a calculation tool developed by the Department of Real Estate Management, University Leipzig). The costs and benefits of the current use on the one side and the proposed use on the other side were compared within a cash flow analysis.

Additionally the costs and benefits for each stakeholder were assessed. The following types of stakeholders were taken into consideration:

- DB AG as supplier of the brownfield sites
- Suppliers of the greenfield sites
- Buyer/investor of the brownfield sites
- Buyer/investor of the greenfield sites
- Local authority of the brownfield sites
- Local authority of the greenfield sites

In case the results of the investment calculation showed the proposed reuse being not cost-effective the opportunities of involvement of local authorities, financial support and subsidies as well as other measures such as cooperation between local authorities and private stakeholders (e.g. PPP-models) were evaluated. In addition, it was shown how the current system of financial support and subsidies poses obstacles for the revitalisation of brownfields.

Fiscal instruments and subsidy systems on a European, national and regional level regarding the development of brownfield and greenfield sites were analyzed with respect to their economic incentives and obstacles for a sustainable reuse of brownfield sites.

Ecologic Assessment of Reuse Proposals

In subproject III, the effects on the environment of the reuse proposals were being investigated for the inner-city brownfield sites and the alternative greenfield sites.

The approach of subproject III (ecological assessment) consists of the following steps:

- Quantifying the traffic volume
- Assessing the environmental effects of traffic
- Assessing the ecologic value of the site

Environmental Effects of Traffic

Vehicle mileage of cargo and passenger traffic was the basis for an estimation of the resulting effects on the environment. A first step for the calculation was a basic differentiation between travel supply and demand data. The travel supply data (relevant road network) of all areas under investigation was implemented in the program VISUM. For calculating travel demand a Trip-End-Model was used. It calculated the trip generation (volume of traffic), the modal split, the trip distribution (traffic flow), and in conclusion the route assignment.

The method of calculating travel demand required a division of the investigation area into smaller regional units (traffic analysis zones) to which spatially oriented data was assigned.

For a definite estimation of generated traffic each model area was assigned to one traffic analysis zone. Traffic flows resulting from traffic demand calculations were converted into vehicle trips using vehicle occupancy rates. The calculation of necessary vehicle output was done by multiplying vehicle trips by trip distances. A methodical difference between calculating cargo traffic and passenger traffic occurs only in trip generation. As far as passenger traffic is concerned, an examination of groups of traffic participants is undertaken whereas in cargo traffic the size of the examined model area and its use (industries) is decisive.

A determination of the environmental effects of traffic was carried out following the methodology of the Wuppertal Institute for assessing environmental effects of traffic flows and traffic volumes (Wuppertal Institut 2006). The effects on the environment are represented as emission loads (CO2, NOx etc.) and the demand for space for moving traffic and car parking. Vehicle mileage and cargo traffic volume constitute the data basis for the assessment criteria including the modal split values.

Ecological Site Value

Increasing growth of settlements and traffic infrastructure is coupled with losses of pristine landscapes and the irreversible alteration of environmental resources, especially soil. An assessment of the ecological aspects of a model site includes the environmental compartments soil, groundwater, climate and air as well as flora and fauna.

For assessment the land value classification model (Doetsch et al. 1998) is used. This method called soil-value-balance was developed for the German Federal Environment Agency (UBA). According to this approach these environmental aspects were weighted and aggregated.

In the present case the assessment method was modified. Instead of using monetary terms a five step grading scale from 0 to 4 was used. The higher the value, the closer the environmental compartment is to a pristine condition. Therefore, the higher the value for a criterion, the higher is its significance for the urban ecology and ecological balance. The aggregated sum of each criterion renders the site value (SV). The SV is calculated for the current use (scenario 1) and for the reuse proposal (scenario 2), respectively.

The difference between the two site values (SV scenario 2 minus SV scenario 1) may assume a positive value in which case the ecological value of the site is increased. Whenever the result assumes a negative value the site value is decreased

Example: A given site with a pristine soil structure, without any surface sealing and with a great variety of plants and animals has a high SV (scenario 1). The establishment of an industry decreases the SV (scenario 2). The calculated difference obtained from SV 2 minus SV 1 assumes a negative value. The change in use of this site has lead to a decrease of its ecological value.

Figure 2 shows how a change in land use of a given brownfield site can lead to an increased SV.

Scenario 1 (current use): inner-city brownfield (high percentage of sealed surfaces, particularly transport infrastructure, soil contamination, few buildings, low percentage of greenfield land). Scenario 2 (reuse proposal): inner-city mixed-use development (combination of residential and industrial/commercial use) leading to a reduction in traffic infrastructure and a reduction of surface sealing as well as an increased percentage of green space.

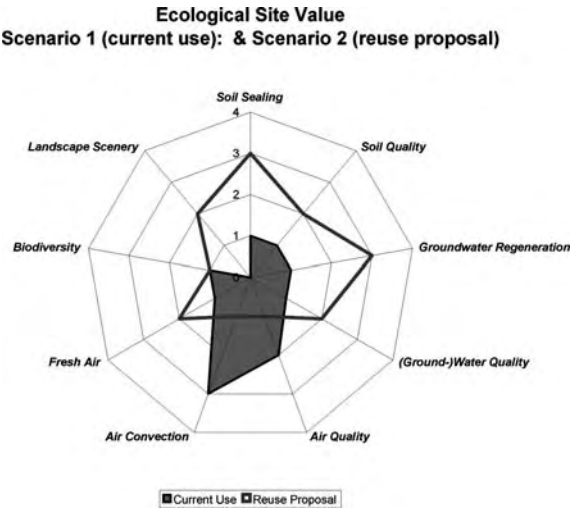

Figure 2: Ecological Site Value

Overall Social Evaluation

The results of the economic and ecological evaluation of the model sites are compared considering the type of location and region. This includes the motives and impacts of individual stakeholders i.e. owner, investor, and local authority.

On the basis of the representative sites general conclusions are drawn concerning the obstacles of brownfield reuse and restraints of current land use policies.

The presented results will constitute significant contributions to support decision making processes in local policy concerning the development of settlement and traffic areas, adjusting them to the changes of demography and to a sustainable urban development.

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3.2 A Framework for assessing the Sustainability of Brownfield Development

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Abstract

In England, the development of urban brownfield sites is a significant planning policy aimed at supporting urban regeneration and protecting the countryside. Brownfield sites are required, in policy, to be developed in a sustainable way. However, determining what this means in practice is unclear. This paper presents a framework for assessing the sustainability of brownfield developments, devised to clarify the stakeholders in land reuse and establish how sustainability can be achieved on reused sites. The framework has been used in research investigating the sustainability of five brownfield developments in England. The performance of the framework in this research is assessed and its potential practical use outlined.

Introduction

In England, the development of brownfield sites is seen by Government as a significant means of contributing to urban regeneration (DETR, 2000; Schoon, 2001, Adams, 2004). 'Brownfield' refers to land that has been previously developed (DETR, 2000a, Annex). Reusing urban land is argued to help create a sustainable urban environment, aid the prevention of urban sprawl and stem the tide of out-migration from urban areas. It is a mechanism to deliver more compact cities, to make the most efficient use of existing urban infrastructure and to reduce the need to travel (Breheny, 1992; Williams et al., 2000).

In England there are approximately 65,000 hectares of previously developed land (English Partnerships, 2003). The policy of reusing such land in urban areas is seen by the Government as a 'win-win' strategy. Previously developed land is brought back into beneficial use, and development pressure on greenfield sites is relieved. Hence, recent urban policy, planning guidance and housing programmes have supported brownfield development (DETR, 1998a; DETR, 2000b; DETR, 2000a). The Government has also set measurable targets for land reuse. The most significant is for 60% of new housing to be built on brownfield sites by 2008 (DETR, 2000a). In combination, these prescriptions are the most stringent and mature in Europe and probably globally.

Alongside policy prescriptions to develop high quantities of previously developed land, there are also policy requirements to develop brownfield sites to be sustainable in their own right and not just as a contribution to strategic urban development patterns. National planning guidance on sustainable development (ODPM, 2005) and the Government's key urban policy document, The Urban White

Paper (DETR, 2000b) stress that all developments should now fully address sustainability principles. However, for those wishing to deliver sustainable brownfield development, translating policy objectives into action at the site level is problematic. First, much policy and guidance is imprecise and open to interpretation. For example, the Urban White Paper uses phrases such as 'efficient use of available land', 'reasonable densities' and 'good design' (ibid, p. 43) to describe its vision for urban areas. Second, much guidance is not precise about its definition of sustainability: in some only environmental issues are considered, whereas elsewhere social and economic elements are also included. Third, it is not always clear which aspects of a development need to be sustainable: is it the land remediation process, the planning process, the buildings themselves, the final uses of the development, or all of these? Fourth, some sustainability objectives, when implemented, can give rise to contradictions, and can conflict across issues and spatial boundaries (DETR, 1999a). Policy guidance does not address how to make judgements in these instances.

It was in the light of these problems that a three-year research project entitled ‚Achieving the Sustainable Development of Brownfield Sites in England' was instigated. The aim of the research was to investigate the extent to which sustainability was being achieved in land reuse projects in England. Specifically, it aimed to find out which elements of sustainability were considered or omitted by those involved in brownfield development and the reasons for this. Because the research was concerned with detailed decision-making, a small number of in-depth case studies (five) were chosen. The cases were recently completed developments on brownfield sites. In each study, the redevelopment process was investigated through analyses of planning files and other documentation and through interviews with key stakeholders in the developments.

Before the empirical research could begin, it was essential to gain an understanding of sustainable development in the context of land reuse. In order to do this, a framework for assessing the sustainability of brownfield developments was developed. It was important that the investigation was conducted from a sound knowledge of the state of the art in terms of both who was involved in brownfield development (the key stakeholders) and in terms of what, according to current literature, they could achieve in terms of sustainability by their involvement in land reuse. Devising such a framework has not been done before (Pediaditi et al., 2005 have addressed this problem, but from a procedural perspective) and required the distillation of a vast literature on the subject.

The development of the framework is the focus of this paper. It explains how the framework was devised, and outlines its usefulness for the case study research and beyond. A brief summary of the research method is presented to illustrate the framework's effectiveness, however extensive research findings are reported elsewhere (Dair and Williams, 2006). The purpose of this paper is to reveal the thinking behind the framework, and to set out how theory on sustainable development can be made meaningful at the development project scale, in any given context.

The framework has two parts, which are described in the next sections of the paper. Part A identifies who is involved in brownfield development. It describes the key stakeholders in the land reuse process. Part B is a list of sustainability objectives that stakeholders should address in brownfield projects, with examples of how these objectives could be met. The paper ends with a discussion of the use of the framework in the empirical research, and comments on the difficulties in conceptualising and defining sustainability for development projects. Some suggestions for the wider application of the model are also given.

Part A of the Framework: Stakeholders involved in the Development and the use of Brownfields sites

Part A of the framework required identifying the stakeholders involved in the development and use of brownfield sites. Table 1, below, shows the outcome of a review of literature and policy documents to achieve this. Use was made of the work of Ambrose (1994) and Alker et al. (2000) in addition to Article 10 of the Town and Country Planning (General Development Procedure) Order, 1995 (SI no 419). To help structure the table, three main spheres of activity in the development process were identified: land use planning and regulation; development and construction; and end use. Development activities rarely fit into these simplified categories, and there is considerable interaction between the three spheres. However, for the purposes of the research, this separation was useful because it helped identify where different stakeholder groups are likely to be most active, and where they can have an impact on sustainability. For each sphere of activity, several key groups of stakeholders were identified (presented in the left-hand column of Table 1). Examples of the stakeholders are given in the right-hand column.

Table 1: Stakeholders involved in the development and use of brownfield sites

Stakeholder groups	Examples of types of stakeholder within each group
Stakeholders involved in land use planning and regulation	
Group 1 Regulators, statutory consultees, service providers and councillors	• Environment Agency (EA) regulators (e.g. pollution control regulators, drainage and flood defence regulators, biodiversity protection regulators) • Local authority regulators (e.g. planners, urban designers, environmental health officers, highways and transport regulators, landscape architects) • Councillors • Health and safety executive regulators • Building control (Local authority or approved inspectors such as National House Building Council) • Utility regulators and service providers (gas, electricity, water and drainage) • Central government departments and regional authorities
Group 2 Non-statutory consultees, interest groups, and individuals	• Business interests • Pressure groups • Community group interests • Individuals
Stakeholders involved in development and construction	
Group 3 Property developers and developer interests	• Public sector and private developers • Investors (e.g. banks, pension funds) • Land owners • Shareholders of investing institutions and developers • Construction workers • Suppliers
Group 4 Professional advisors	• Lawyers • Architects, planning consultants, conservationists and archaeologists • Civil and environmental engineers • Surveyors • Insurers and valuers • Landscaping consultants
Stakeholders involved in end use	
Group 5 End users	• Clients of developers (e.g. manufacturers, business entrepreneurs, retailers, home buyers, public service providers) • Residents of dwellings and residential homes • Proprietors of commercial businesses including, offices, shops; restaurants, and their suppliers, employees and customers • Managers and proprietors, of public/private institutions including schools, hospitals, and leisure centres and their employees and visitors • Landowners of public/private open space, parks, gardens, woodland and the public that uses those areas

In land use planning and regulation activities, a group of stakeholders identified as 'regulators, statutory consultees, service provides and councillors' was identified (Group 1). This group, to varying degrees, has powers to require amendments to development proposals (Bell, 1997: Grant, 1990). These people are responsible for enforcing regulations on issues such as environmental health, drainage, roads and traffic management, building quality and planning issues. The group also contains Environment Agency regulators who are responsible for the environmental aspects of, for example, pollution control, drainage and biodiversity. In addition, local councillors are part of Group 1, but their powers extend beyond requiring amendments as they have the right, within certain constraints, to refuse proposals for development.

Also involved in land use planning and regulation are Group 2, the non-statutory consultees, interest groups and individuals. This group differs from Group 1 in that it has no direct power to influence a development proposal. Its power rests in its capacity to influence the decisions taken by those that do have direct authority. In particular, representation by this group to the planning authority must be considered by councillors when making decisions on whether to grant planning permission.

The next section of the table introduces the stakeholders involved in development and construction activities. Group 3 is identified as 'property developers and developer interests'. Production of the built environment is crucially dependent on the decisions of private and public sector developers and the abilities and co-operation of construction workers and suppliers. As a result this group has authority and power (albeit fluctuating) to influence development projects. Also active in development and construction activities are Group 4, the 'professional advisors'. This group provides expert advice on development sites and proposals. These are people or organisations employed for their professional expertise, for example, lawyers, architects and valuers.

Stakeholders identified as the 'end users' of a development are classified as 'Group 5'. These are the people or organisations that use the development once it is completed. This group, as prospective purchasers or tenants, collectively represent demand in the development and construction market and as such they can have a powerful influence on development outcomes. Examples of this group are residents of housing schemes, proprietors of commercial premises, or public users of the space.

Of course, the development process is complex and the implementation of a project requires involvement by numerous stakeholders, none of which have overall authority or power to enforce sustainability objectives. Each of the groups identified (and individual stakeholders within these groups) may have their own ideas about what constitutes a sustainable development and they can influence, to varying degrees, the way in which a development proceeds. Furthermore, not all stakeholders will be involved in every development. Hence, this categorisation is a useful reference for identifying the range of potential stakeholders in any given brownfield project, and was used to help identify the interviewees in the empirical research, but it cannot be used to explain influence or power in practice, nor to predict who might be more or less concerned about achieving a sustainable outcome.

Part B of the Framework: Sustainabilty Objectives to be met in Brownfield developments

The issue of how the stakeholders could achieve sustainable development through the reuse of a brownfield was addressed in Part B. The approach taken in developing this part of the framework was: first to establish a definition of sustainability appropriate to the scale of a brownfield development; second, to use that definition to develop a number of precise sustainability objectives that could be achieved

through development; and third to seek practical examples of how these objectives could be delivered.

This objectives-led approach allowed for the development of a discrete number of clear sustainability aims, but also for the expansion of the framework by adding practical examples of how these objectives could be achieved as suggested in the literature and in case studies. There are advantages in using objectives because rather than prescribing the action needed to achieve those objectives they allow for flexibility in interpretation. This facility is important because no two brownfield developments are the same. The objective-led framework enables the unique context of development to be taken into account as well as new understandings of cause and effect in relation to sustainability and technical innovations. The literature review revealed that the range of ways that the sustainability objectives could be achieved was, if not infinite, then certainly numerous. By taking the objectives as the starting points for the empirical research, it was possible to investigate the case studies by seeking the extent to which they had met these objectives, and identifying examples of how they had been achieved. Not all the objectives will be applicable to all brownfield sites, this will depend on the local context. But the framework covers the main sustainability outcomes that can potentially be achieved through land reuse in the light of current knowledge.

For the research a sustainable outcome refers to both the 'process', meaning the planning and construction elements of creating a brownfield scheme, and the product of the development, meaning the resulting physical environment. Hence, a sustainable brownfield development is one that has been produced in a sustainable way and which, according to theory (see full discussion below) provides a physical environment to enable end users to undertake their activities more sustainably. This research was concerned only with sustainability objectives that could be achieved through the physical development of brownfield sites, so excludes aspects of sustainability not related to the built or natural environment.

A definition of sustainable development appropriate for brownfield development

The debate about definitions of sustainable development has been ongoing for over twenty years, however it is now commonly understood as 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs' (WCED, 1987, p.8). The consensus now is that sustainability requires the integration of social, environmental and economic development in a way that is equitable and lasting (DETR, 1999a). This means applying the principles of intergenerational equity (or futurity) and intra-generational equity (or social equity) to decision making about social, environmental and economic issues at all times (Selman, 1996; FOE, 1994). If this is taken as a principle for development projects it becomes easier to see how practical objectives for brownfield development could be achieved. In the framework, each of the broad components of sustainability (economic, social and environmental) was considered, and literature and policy reviewed to determine objectives suitable for brownfield developments that adhered to concepts of futurity and equity. A summary of this review is given in Table 2 on the next page. The next three sections of the paper describe how these objectives and examples were derived.

Table 2: Sustainability objectives to be met in brownfield developments

Sustainability Objective	Examples of how these objectives can be met in brownfield developments
Economic Sustainability Objectives	
1.To enable businesses to be efficient and competitive	• Reduce energy consumption in construction • Reduce waste in construction e.g. recycling of materials • Provide infrastructure and buildings that enable businesses to keep energy and water consumption to a minimum • Provide developments with renewable energy power sources • Provide high quality urban design, including secure premises • Provide high quality buildings that are flexible and can be adapted with minimum costs • Provide transport infrastructure to meet business needs
2. To support local economic diversity	• Provide higher densities to enhance commercial viability • Provide a mix of uses to increase viability and vitality of commercial areas • Enable a supply of properly serviced land and business premises • Use locally produced goods and materials in construction
3. To provide employment opportunities	• Provide a mix of uses to give choice of employment • Develop high quality buildings for manufacturing and commercial activities • Increase the recruitment of local unemployed people • Provide a mix of uses to give choice of employment
Social Sustainability Objectives	
1. To adhere to ethical standards during the development process	• Ensure ethical trading throughout the supply chain of a development • Provide a safe and healthy work environment • Comply with labour conventions e.g. non-discrimination at work and reasonable hours
2. To provide adequate local services and facilities to serve the development	• Provide space for training • Provide open space for community benefit • Develop good quality energy efficient buildings for community activities • Offer a mix of retail spaces
3. To provide housing to meet needs	• Develop a mix of housing tenure and type • Provide affordable housing • Provide high quality and flexible buildings that minimise the use of resources • Provide secure dwellings with the layout of buildings and spaces arranged to deter crime.
4. To integrate the development within the locality	• Provide multiple links to adjacent neighbourhoods • Reject or discourage gated developments • Create a mix of transport provision with a variety of modal links to services, work, leisure and homes • Provide good access for people with disabilities
5. To provide high quality, liveable developments	• Ensure sensitive, high quality architecture, civic design and master planning • Design to reduce crime • Design for road safety • Provide a mix of uses (to encourage social interaction)
6. To conserve local culture and heritage, if appropriate	• Reuse locally-valued buildings • Design developments to reflect local heritage and use local materials
Environmental Sustainability Objectives	
1. To minimise the use of resources	• Use renewable materials e.g. sustainably produced timber • Use recycled materials - e.g. aggregates • Use renewable energy sources e.g. wind turbines, photovoltaic cells • Design developments for minimum waste during construction, life and after-life • Use materials with low energy inputs
2. To minimise pollution	• Remediate contaminated land • Reduce air pollution including dust during construction • Mitigate noise pollution both during and after construction • Provide infrastructure for public transport, walking, cycling • Raise densities on sites within 800 meters of existing centres, services and transport corridors • Design buildings for minimum energy consumption in use
3. To protect biodiversity and the natural environment	• Conserve flora, wildlife and habitats on site • Provide wildlife refuges, such as ponds and wild areas • Use sustainable urban drainage systems to protect rivers and water courses from pollution and flooding

Economic sustainability objectives to be achieved through brownfield development

There is now a large literature on sustainable economic development. The task here was to determine how economic sustainability could be progressed through development on a brownfield site. Arguments about what constitutes economic sustainability tend to concern global issues such as international trade, wealth inequalities, and uneven development patterns and are difficult to relate to physical boundaries. To overcome this problem, use was made of literature on sustainable economic regions, cities and neighbourhoods, urban regeneration and space competitiveness (Jacobs and Stott, 1992; LGMB, 1993; DETR, 1998b; DETR, 1998c; DETR, 2000c).

The review revealed that economic sustainability is the most contentious of the three elements of sustainability, and that there are disagreements about its definition. Many see economic growth as necessary for sustainability as it provides the financial resources for technical advances required to solve environmental problems and overcome poverty: others argue for a radical change in the growth paradigm and in resource allocations (Elkin, 1986; McLaren et al., 1998; Levett et al. 2003). This view seeks a new political economy that challenges the right to the polarised standards of living that favour rich nations, seeking instead to prioritise the needs of the poor via redistribution rather than economic growth. In the last twenty years, it is the former approach that has dominated. Hence, it was the perspective adopted in the framework.

If this view is taken, the development of a brownfield site provides an opportunity to contribute to sustainable economic growth in several ways: through the businesses involved in producing the development; through those businesses locating in the development once it is completed; via the property investors who own the development and whose main interests may lie in rental incomes and increases in capital values; and through the economic activities of the households and other occupiers of the completed schemes. These economic activities are reflected in three economic sustainability objectives in the framework.

The first objective is to enable businesses to be efficient and competitive. This applies to businesses involved in development and construction, those located on the site once it is built (should commercial uses be included), and investors who own the development. The physical environment of a brownfield development can support business efficiency in a number of ways. Taking the construction phase first, this objective could be achieved by minimising waste (e.g. by recycling building materials) or reducing energy consumption. To help businesses operate efficiently as occupiers of a completed building means keeping operational costs low by, for example, providing infrastructure and buildings that keep energy and water consumption to a minimum. Businesses can also be supported to be efficient and competitive through the 'added value' of urban design (CABE and DETR, 2001a) and building quality (see, for example, CIC, 2002) which can produce high returns on investment and create a more productive workforce. Business efficiency and competitiveness can also be supported on reused sites by the provision of good transport links and infrastructure (DETR, 2000b; Parkinson et al., 2004). Appropriate transport infrastructure and connectivity can be achieved by, for example, providing links from the site to main transport corridors or providing convenient access to foot and cycle networks.

The second economic objective relates to the broad economic influence brownfield developments can have on their surroundings. This has been summarised as 'to support local economic diversity'. Arriving at this objective was not straightforward because if sustainability is considered at a global scale, supporting further economic diversity in one locality can be

seen as contributing to greater spatial inequalities. However, by definition, brownfield sites have a unique location, and achieving sustainability on them requires making the best use of that site. For this reason, most research on urban economic sustainability argues that land reuse has an important part to play in making efficient use of existing infrastructure, services and business opportunities, and that economic diversity is a key to the sustainable economy of an area. A range of diverse economic activities can also maximise opportunities for using local workforces, resources and supply chains, and protect an area from decline should one economic sector experience a downturn. Local business diversity can be supported in a number of ways, for example, during construction, locally produced goods and materials can be used. In terms of the type of buildings then developed on the site, high densities and mixed uses can both enhance the commercial viability of a development and, if housing is provided, ensure sufficient population densities to support local businesses (DETR, 1998b). Mixed-use areas have also been shown to help retain money circulating within the local economy for longer periods, with the effect of increasing growth in that area (Dixon and Marston, 2003)

Brownfield sites can also provide job opportunities. Sustainable economies are those with high and stable levels of employment and low welfare costs. Hence, the third and final economic sustainability objective is 'to provide employment opportunities'. The reuse of brownfield land often provides an opportunity to provide new investment in job creation, particularly where it is the site of previous job losses. Employment opportunities can be maximised by, for example, providing a mix of uses to give a range of employment types or ensuring the development is easily accessible to the local workforce.

In summary, three economic sustainability objectives could be met through brownfield developments, and there are numerous examples of ways in which they could be achieved. However, both the objectives and the means of meeting them are the subject of considerable debate in terms of their efficacy and impacts on wider economic conditions. The literature on defining economic sustainability is not conclusive, and synthesising it for application in brownfield developments is problematic. However, the objectives presented here are recurrent in the literature, and offer a practical definition of the concept applicable for land reuse.

Social sustainability objectives to be achieved through brownfield development

As with literature on economic sustainability, that addressing 'social sustainability' is broad and diverse. Furthermore, the literature on the relationship between the physical environment and social impacts has a long and contentious history. However, an analysis of research reveals two distinct elements of social sustainability useful in understanding how to relate the concept to land reuse. These can be classified as either the elements of social sustainability which affect individuals and human well-being such as health, shelter, sustenance, education, mobility and equality, or the collective 'social capital' elements, which are associated with social interaction. Social capital is derived from the collective experiences and behaviour of individuals who share values and a sense of purpose. It is developed when people come together to collectively pursue, create, or change, society to achieve social benefits. Both elements of social sustainability can be supported or restricted by environmental conditions, and both contribute to the over-riding aim of social equity. Hence, translating these concepts into objectives for brownfield development becomes feasible.

The first social sustainability objective is 'to adhere to ethical standards during the development process'. This can be achieved by ensuring ethical trading throughout the supply chain of a development, providing a safe and healthy work

environment and complying with labour conventions e.g. non-discrimination, reasonable hours and so on. This contributes to both individuals' quality of life and to social capital.

The second objective is 'to provide adequate local services and facilities to serve the development'. Services include community buildings, open and play space, shops and schools. Provision of services is important to enable people to meet their individual needs for education, healthcare, leisure and so on, but also to help communities develop social capital by providing space for formal and informal social interaction. Adequate provision of services is also seen to help avoid social exclusion (DETR, 2000b: ODPM, 2003: JRF, 1999).

Appropriate housing is also a key component of social sustainability. Hence, the third social objective is to 'provide housing to meet needs'. Clearly, not all brownfield developments will be appropriate for housing, but with the target in England that 60% of all housing should be on previously developed land it is important that this housing contributes to sustainable patterns of development. Ensuring that the accommodation provided meets local needs is the key. Housing provision should also be responsive to the changing demographic profile of households (e.g. more smaller and older households) (Rudlin and Falk, 1999) and to the ways in which homes are now used (CABE and DETR, 2001b). A mix of housing types and tenures can lead to a better balance of demand for community services, provide opportunities for 'lifetime' communities' (i.e. where people are comfortable to live at any age), enable community self help (e.g. in child care), and assist in community surveillance (CABE and the DETR, 2000).

The fourth social sustainability objective relates to ensuring that people can, in physical terms, access local services, facilities and jobs. Hence, this objective is 'to integrate the development within the locality'. This is particularly important on brownfield sites that previously had industrial uses and may no longer have good connections to the rest of a town or city. This physical integration is important as disadvantaged societies are often physically isolated (JRF, 1999) and transport and accessibility problems can be a significant barrier to social inclusion (Social Exclusion Unit, 2003). Integration can be achieved by providing multiple links to adjacent neighbourhoods, ensuring new developments are not 'gated', and creating a mix of transport infrastructure provision. It is essential that the design of the development considers a range of users including children, teenagers, people with disabilities and older people.

Not only do brownfield developments need the right balance of uses for their context, and need to be well integrated, they also need to be attractive places to live so that people and businesses want to move to them and remain there long term. Hence, the fifth social sustainability objective is 'to provide high quality, liveable developments'. Recently there has been much emphasis on this aspect of planning, with urban design in particular being better understood and promoted. High quality and liveability can be achieved through sensitive architectural, civic design and master planning, design to reduce crime, and the right mix of uses to encourage social interaction. It is also important that developments are designed for safety, both in terms of crime and road traffic. Much literature emphasises the importance of public or community participation in achieving liveable, sustainable schemes that meet the needs of local people, and there are numerous methods of good practice in public engagement. These include community planning and design processes.

The final social sustainability objective relates to the cultural context of brownfield development. Brownfield sites often have strong social or cultural meanings for people, particularly where they were previously the location of a dominant lo-

cal industry. Social sustainability literature puts a strong emphasis on culture and heritage as means of supporting social capital. Hence, the fifth objective is 'to conserve local culture and heritage, if appropriate'. Much research has been done on the conservation of social and culturally meaningful space and there are a number of techniques for achieving this, from retaining existing buildings and employing local skills in new developments to commissioning public art to commemorate past cultures (Williams, 2004: JRF, 1999). This said, in some cases it is not beneficial or appropriate to mark historic uses, particularly if they have negative associations for local people. In such instances creating a new image for the area may be more appropriate.

In summary, there are a number of ways of contributing to social sustainability by supporting both individuals' well-being and the development of social capital through brownfield development. However, as with economic sustainability there is still confusion and some contradictions in the literature. It is difficult to be precise about the relationship between social outcomes and particular developments because people live their lives in numerous settings and are not only enabled or constrained by their home or work environment but also by their wider neighbourhood, city and region. It is also impossible to be certain about the extent to which the built environment, as opposed to broader political, cultural and economic conditions, affects social life. This said, there is a high level of agreement that the built environment can have significant effects on social equity, and the objectives established here are grounded in research evidence and are significant as potential benefits to be achieved through land reuse.

Environmental sustainability objectives to be achieved through brownfield development

Environmental sustainability is the easiest element of sustainability to define as 'site specific', although there are difficulties in determining the environmental impact of any development in spatial terms. Environmental sustainability requires the prudent use of natural resources and the protection of ecosystems and biodiversity. In terms of action to take on brownfield sites, the literature in this field is far more developed than that for social and economic sustainability (Vels, 2002; DTI, 2005; Barton et al., 1995; 2003: Birkeland, 2002). There is also now a number of comprehensive checklists for sustainable development at the site scale and again, these are best when prescribing environmental action (SEEDA, 2000; BRE, 2001). The environmental literature is not completely consistent, with some divergence of opinion on the technical aspects of sustainable design and on acceptable levels of environmental impact. However, because of the history of the debate, this literature was easier to distil into objectives for land redevelopment than that relating to society or the economy.

Brownfield development projects offer opportunities for the achievement of environmental sustainability throughout the life-cycle of a development. There are environmentally sustainable methods of land remediation, construction, planning and design. There is now also a growing interest in environmentally sensitive decommissioning or demolition of buildings (Golton, 1997). Hence, at each stage of the development process, environmentally sustainable objectives can be applied. In all, three environmental sustainability objectives were established.

The first objective is to minimise the use of resources. This can be applied throughout the construction process and in end use, and also implies minimising waste. This is important to ensure that finite resources are used prudently, and is an area where significant improvements can be made (DETR, 2000d). This objective could also be supported by companies using environmental management systems (e.g. ISO14001 and Eco-Management and Audit Scheme, or EMS) to monitor environmental impacts throughout their sup-

ply chains and develop mechanisms to reduce them (DETR, 1998d). In addition, buildings and developments can be designed in such a way to minimise resource use in operation (DETR, 2000b, p.30). Resource savings can be achieved through, for example, building water- and energy-efficient buildings (i.e. installing water recycling facilities or high standards of insulation) or through urban layouts that encourage fuel-efficient modes of transport, such as walking and cycling.

The second environmental sustainability objective is to minimise pollution. Again, this relates to the remediation of the site: e.g. choosing remediation methods that clean up contaminated land rather than moving it elsewhere. It also applies to construction techniques, for example, ensuring no air and noise pollution during building, and by choosing less polluting materials (Anderson and Howard, 2000). It is pertinent also to the planning, design and uses on sites. For example, infrastructure can be provided to ensure that people walk and cycle rather than use their cars, and buildings can be designed for minimum energy consumption in use, hence reducing off-site pollution from power plants. Clearly, end uses should not release contaminants to the atmosphere, ground and water.

The third objective is to protect biodiversity and the natural environment. This objective is central to the sustainability debate. Again, it is applicable throughout the life-cycle of a brownfield project. It could mean that, where a site has been undeveloped for some time, an environmental study is required before any development begins to assess flora, wildlife and habitats. It could also be achieved by planning for wildlife connections across the site to adjacent habitats, or by providing open space and gardens in residential schemes (Birkeland, 2002). Protecting the natural environment also includes taking measures to protect rivers and watercourses from pollution and flooding through the use of porous paving and water recycling systems and other forms of sustainable urban drainage system.

Overall, although designing in an environmentally sustainable way requires technical knowledge it is easier to define than achieving social and economic sustainability through land reuse. Of course achieving developments with minimal environmental impact while also performing the required economic and social functions is challenging, but conceptualising environmental sustainability objectives and finding examples of how they could, in theory, be achieved is possible from the well developed literature.

Discussion on the use of the Framework in the Case Study Research, and its potential for wider Application

The framework was used as a research tool in the five case studies of recently completed brownfield development projects in England. The developments were chosen to be 'conventional' developments, with the exception of one that was chosen for its sustainability credentials. They were in urban areas and were completed or near completion. The cases were situated in Newcastle, York, Abingdon (Oxfordshire), Sutton (London) and Bristol and were a combination of housing developments and mixed-use schemes.

In each case study, empirical evidence was gathered that tracked the development process, including the decisions made on sustainability objectives. The information on stakeholders' actions was collected through scrutiny of local planning authority (LPA) documentation and interviews. During the study of LPA files, Part B of the framework was used to assess the number of sustainability objectives considered and achieved (or not considered or not achieved) in each case. Examples of how to achieve the objectives were added to the original draft of the framework when they appeared in the research. As each planning application was assessed, the ways the objectives were addressed and (or) achieved were noted,

and the stakeholders involved in that objective recorded. Part A of the framework was then used to identify and categorise the interviewees, with stakeholders from all groups being questioned. Evidence of stakeholders' action or inaction, gathered from the LPA's files, formed the basis of 63 semi-structured interviews with the stakeholders involved in the developments. From the interviews, the stakeholders' reasons for considering, not considering, and rejecting aspects of sustainability were established, and a picture of the sustainability of each development was formed.

The framework enabled a robust and theoretically grounded analysis of the case studies. It facilitated:

- the identification and categorisation of stakeholders involved in the case studies;
- the identification of stakeholders who should, according to statute or good practice, have been involved in the case studies but, for a number of reasons, were not;
- an objective assessment of the achievement of sustainability objectives relevant to each development; and
- an empirical comparison between case studies of the extent to which sustainability objectives had been achieved.

Hence, for the purposes of this research the framework was an effective research tool. This said, developing and using the framework was not without its problems: mainly because devising it raised some important questions about the nature of sustainable land use. In particular it revealed the paucity of precision in policy in formally defining both who is involved in land reuse (and their responsibilities and powers) and what is meant by sustainability in this context.

First, in terms of identifying the stakeholders involved in brownfield developments, the list presented in Table 1 is a subjective conceptualisation of those involved in a complex, multifaceted process. In the research, not all the stakeholders were involved in all developments, and not all had an impact on whether the developments were sustainable. Different stakeholders championed sustainability in different cases: in some instances planners took a lead, in others it was the developer. Nor did the stakeholders have equal rights and powers within the development system: there are key decision makers without whose authority developments cannot proceed, yet those funding the development also have considerable power in determining what they provide. The framework can be used as a reference to check the potential stakeholders in any given development, but it does not predict which groups may be more or less interested, or powerful, in realising sustainable outcomes.

Second, not all the objectives presented in the framework are relevant in every brownfield development. Local context dictates the objectives that are more or less important. Hence, in the case studies, many of the objectives were classed as 'not relevant'. However, a distinction had to be made between those that were not relevant (usually because of the local context) and those that were relevant but had not been considered by the stakeholders. This was an important aspect of the research and explained the poor performance in realising sustainability objectives in most of the case studies: it was not that sustainability issues had been considered and not realised, they had just never been on the agenda.

Third, the case studies revealed, unsurprisingly, that many of the objectives in the framework are not compatible or synergistic when implemented. This reflects the nature of sustainability in practice, and is an issue conveniently overlooked in land reuse policy guidance. In listing the objectives, the framework does not resolve these conflicts, but reflects the lit-

erature and makes the conflicts transparent. In reality, deciding between conflicting objectives requires political decision making.

Finally, it is difficult to compare the sustainability of one scheme with another: the framework does not give a 'weighting' or prioritise the objectives. Therefore it is not possible to 'score' a development (this was not the purpose of the framework). It is possible to determine how many objectives a scheme has met, but this is misleading because, as discussed, not all objectives are relevant in each case and in any given brownfield development some sustainability objectives will be deemed more important than others. However, through the identification of objectives that are being implemented or ignored it is possible to form a collective view of the main area of achievement in sustainability.

Notwithstanding these issues, the framework proved useful in assessing the sustainability of the case studies in the research. More importantly it has a use beyond this function because it translates imprecise policies and complex theories on economic, social and environmental sustainability into meaningful site level practices. In this way, it is an important tool for those trying to grapple with, and implement, some of the more vague policy guidance that requires brownfield sites be developed in a sustainable way. In particular it could be used by:

- policy makers attempting to translate national guidance on sustainable land reuse into workable, local policies or guidance;
- developers, developer interests and professional advisors drawing up plans for sustainable brownfield developments;
- all stakeholder groups assessing plans for potential brownfield projects;
- planners and others involved in organising consultation exercises on land reuse projects: the framework could be used as a focus for discussion and a decision-support tool; and
- those involved in monitoring or evaluating completed brownfield projects.

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3.3 Smart Economic Growth (SEG) – smart ways of spatial and economic development in metropolitan areas

Dagmar Cohrs, Sandra Pennekamp

ABSTRACT

The Project Smart Economic Growth deals with proceedings of planning and developing employment land and associated development policies aiming at the reduction of negative effects of economic growth in metropolitan areas. The definition of Smart Economic Growth was agreed including explanations of what smart means in this context. Important issues of the project are the analysis of Case Studies, the work in Local Groups engaging with key stakeholders and the transnational cooperation. Four elements of Smart Economic Growth are defined to point out the complex structure and interdependencies: Smart Policies are needed to set the framework for an integrated land-management, using instruments and tools for a Smart Land-Use and developing Smart Business-Sites in which businesses have the possibility and environment for innovative work and assignment of Smart Working Practices. Result of the project will be amongst others a handbook with lessons learned and recommendations for Smart Economic Growth.

Introduction

European metropolitan areas are considered to be engines of economic growth and they are important players to achieve ambitious Lisbon goals. High levels of economic growth are coupled with significant negative effects like consumption of land and pressure on greenfield, high land and labour costs with impacts on new and existing businesses, labour and skills shortages putting pressures on local services and facilities, increased traffic congestion and declining quality of environment. It is evident that these impacts endanger further development.

Within the Interreg IIIB-Project 'Smart Economic Growth' (01/2006 to 06/2008) seven partners of four countries will work out smart solutions to reduce the footprint of economic growth and to encourage integrated land management in growing regions. The partners are: Surrey County Council (UK), Buckinghamshire County Council (UK), South East England Development Agency SEEDA (UK), Technical University of Darmstadt (D), Planning Authority Frankfurt/Rhein-Main (D), Consortium Province of Flemish-Brabant – Intermunicipal Agency Interleuven – Intermunicipal Agency Haviland (B) and the Province of Utrecht (NL).

They represent the North West Europe metropolitan areas South East Region (UK), Rhine-Main Region (D), Randstad Holland (NL) and Brussels Region (B).

Objectives and Definition

The objective of the project is to discuss and advance alternative proceedings of planning and developing employment land and associated development policies, ensuring most efficient use are made of land and other resources. Within the project there are two main approaches

– a theoretical and a practical. The theoretical approach is to analyse existing research and results of other projects in terms of relations between spatial and economic development, impacts of structural changes in economy and society and changes of business-requirements in terms of space, land-use and processes. This led the project to a definition of Smart Economic Growth which is "Optimising the potential of people, places, space and technology to encourage sustainable growth for regions by using policies, methods and technology that deliver both economic growth and better quality of life for Europe' regions".

Corresponding to this definition, 'smart' implies seeking and testing new solutions and tools (particularly by international cooperation) that are responding to challenges in an imaginative way. Smart is being prepared to be flexible and adaptable (dynamic processes) and always looking for advantages and optimising benefits. Last but not least smart is aiming for 'wins' on several fronts simultaneously.

The practical approach includes the analysis of Case Studies (Best-Practice) and the work in 'Local Groups' to discuss and develop recommendations influencing future policy and practice. The Local Groups engage with key stakeholders including businesses and local governance to encourage improved exchange and co-operation between them. The work of the Local Groups will be summarized in international workshops to get new and innovative approaches out of international working. The analysis of Best-Practice-Examples is an important issue to underline the work. For many reasons practical examples are more impressive than theoretical text.

Furthermore the transnational cooperation is very important for the results of the project. The partners learn from the approaches in the different regions and transfer knowledge to their own regions.

Key Issues – similarities and differences in the metropolitan regions

A discussion on key issues shows similar trends but some different characteristics in the metropolitan regions in the partner countries. The metropolitan regions are growing regions with high productivity and high pressure on developments. But in some terms the economic key data is different. E.g. in South-East-England the unemployment rate is low (3,6%, www.seeda.co.uk 2007) while the rate is higher in Rhine-Main region (7,9%, IHK-Forum Rhein-Main 2005). This means that economic growth in Rhine-Main should (among others) generate new jobs while economic growth in South-East-England is supposed to increase productivity to make better use of existing labour and space.

In terms of skills there are some differences, too. Although in Rhine-Main or Brussels Capital Region the unemployment rate is relatively high businesses have problems to fill job vacancies in some sectors. One reason is a mismatch between employers' requirements and profiles of applicants for work (qualifications, skills, experiences). In South-East-England the problem to meet labour demand draws through all business sectors and is due to the fact of nearly full employment. (http//: ec.europa.eu/eures 2007)

Nevertheless all regions face constraints on the amount of land available for business development, traffic congestion, ageing population and negative impacts of growing on the environment and the quality of life.

There are a lot of options in metropolitan regions to use existing building sites and brownfield but new working practices and current requirements of modern business call for creative instruments and development processes. It is necessary for spatial planning to estimate the availability and quality of space, to monitor the developments and to develop regional strategies of Smart Economic Growth. The different

Countries therefore feature different approaches and ideas belonging to their respective spatial planning regime, practices and procedures.

Elements of Smart Economic Growth

Within the project four elements of Smart Economic Growth as fields of action were defined:

- Smart Polices
- Smart Land-Use
- Smart Business Sites
- Smart Working Practices

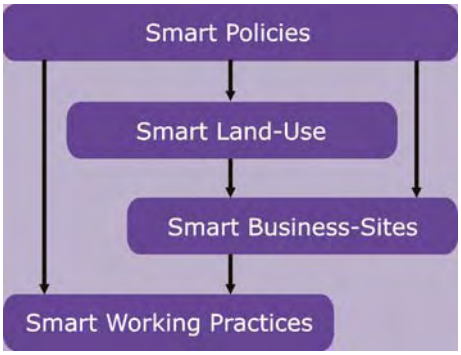

Figure 1:
Elements of Smart Economic Growth

The project partners will have to look for Smart Policies for an integrated land-management to gain smart use of land in metropolitan areas. This means to protect open space, to reuse and to densify inner-city areas and to use technology in a smart way protecting resources and environment. This can be realised especially in smart business sites which deliver not only building land for business but services, support, smart infrastructure and networks and further more possibilities to establish Smart Working Practices leading to increased productivity.

Smart Policies

Smart Policies aim at the reduction of the use of space in a quantitative way and at a more efficient and qualitative land use. They show opportunities for a spaceless growth and for the densification of existing areas, and simultaneously maintain the quality of life and soft location factors. To establish qualified practice and procedures smart instruments and methods on different levels are needed. Smart Policies shall contribute to a long-term strategy of spatial and economic planning.

In the project analysed case studies like the 'Floor Space Index' in the Province of Utrecht and the 'Sustainable Regional Land Management' in Stuttgart Region are examples for Smart Policies.

The Province of Utrecht declared in its Regional Plan the overall aim to spare 15% of space for new built and restructured business parks in a 10 year period (2005-2015). To support this aim a 'Floor Space Index' methodology was developed by the Province. The index expresses the number of m^2 floor space per distributed ground space e.g. of a business park. A high floor space index means that a high ratio of floor space is realised per m^2 ground surface. The total floor area realised on an area of land can be expressed. Herewith it can be appraised if a development site is used intensively or not, and comparisons between developments can be made. On the other hand the index is also used ex ante as a planning aim e.g. as part of the local land use plan. Furthermore with the 'Floor Space Index' methodology also information about the quality of space in business parks is collected, e.g. an intensive use can also mean a multiple use of places. The elaboration of the methodology included an early involvement of relevant stakeholders. It is used as an instrument to stimulate e.g. municipalities and entrepreneurs to implement a more effective use of their land especially in business parks. (Schuringa 2007; The International Institute for the Urban Environment 2003)

With the 'Sustainable Regional Land Management' the Stuttgart Region developed a strategy to reduce the consumption of land and to manage the development in urban areas all over the region. The overall aim is to get an overview about the inner development potentials in the municipalities of the region as a foundation for the preparation of a strategy for land management at regional level. The evaluation of the inner-city development potential was dialogue-oriented and also set of a discussion about instruments and processes which can support the implementation of inner-city development. The cooperation with the different stakeholders was one critical factor for the success. The main results are an internet-based platform showing the areas for development and a catalogue of attributes defining 'potentials' as well as some first examples for an implementation of inner development. With the instrument a sustainable land use management can be supported, green corridors can be protected, existing infrastructure can be used more intensively and the demand for new infrastructure can be reduced, the quality of life and soft location factors can be maintained, vacancies and the downgrading of city quarters can be avoided. Another smart aspect is the long-term thinking on the regional level; the instrument can contribute to convince policy makers and developers to support the strategy of inner development before outside development. (Verband Region Stuttgart 2005)

The Region of Flandern uses a stronger regulatory element for smart land-use with the taxation of empty space or buildings, so that the owner has the interest to avoid vacancies. This method could be combined with other instruments.

But the mentioned instruments and methods themselves only can provide support; they must go hand in hand with an overall strategy and a stimulation policy which shows in long-term the value for the user.

Belgium e.g. has a strategic plan for spatial economy at the regional level (Flanders) and a pact for every arrondissement. At the regional level the existing economic structures and dynamics are analysed and based on development forecasts they set an agenda for further economic development. The pact for the arrondissement says among others which business sectors are seen as key sectors and what are the priorities of further development. And as the partners of this pact (social partners, municipal and provincial authorities, intermunicipal organisations) agree on it they support its implementation.

Smart Land-Use

Smart Land-Use management considers questions like in which way land-use takes place or who uses the land etc. Concrete examples of developments including the change of use, re-use and revitalisation of land in an effective and market-oriented way shall give advice for best practices.

Relevant factors which are reasonable for Smart Land-Use management are e.g. the protection of resources by using brownfields and develop inner-city areas, the use of existing infrastructure, the densification of settlements and business areas to spare new space, mixed-use or special housing offers and pricing for different social levels, special offers for businesses, but also the implementation of energy standards or the use of renewable energy for residential and business constructions, public transport solutions for residents and employees. Special ways of financing the sites and innovative ways of organising the planning process like aspects of involving different stakeholders or residents are further elements for a Smart Land-Use.

One case study for Smart Land-Use is the 'Weststadt Darmstadt' in Germany. For the development mainly brownfields, partly former military and industrial or commercial used land, were used. The aim was to develop the area as an innovative regional business location but also

as an attractive location for living. A mix between working and living was aimed at to achieve a new lively quarter including a high density and sustainable constructions. Today one part of the area is developed as a business and technology park with modern office space especially for ICT by the Deutsche Telekom AG. Furthermore supply for flexible office space and for start-up businesses, but also residential areas with supply for young families were created. Regarding sustainable construction, in the residential but also in the business areas special arrangements for the use of resources like rainwater re-use, use of renewable energy, energy standards for constructions, and individual and public transport solutions were implemented. Another main focus in the development was the organisation of the planning process. From the beginning a special working group at the administration of the city was installed, different stakeholders were involved in workshops and communication tools to inform the public were used. (Gerner 2006)

Another case study which will be analysed in the project is the development of Amsterdam Zuidas, situated in the south of the city of Amsterdam. It is developed as an international hub and facilitates businesses, residences and recreation. The vision or development strategy of the area is updated regularly. Very important aspects are the quality of life and the urban environment; therefore e.g. the traffic infrastructure is brought to the underground. Furthermore sustainability aspects like innovative energy systems, the use of materials and flexible architecture and urban design are implemented. The financing of this big development area takes place via Private Public Partnership and the implementation is organised in cooperation of the City of Amsterdam and commercial parties. (www.zuidas.nl 2007)

Further developments will be analysed regarding Smart Land-Use tools.

Smart Business-Sites

Smart Business-Sites include the combination of demands of businesses and Smart Land-Use. The development of Smart Business-Sites in Belgium relates to the strategy for spatial economy.

The arrondissement Halle-Vilvoorde in Belgium aims at the development of the TDL sector (Transport, Distribution, Logistics) and the intermunicipal organisation 'Haviland' is developer of a business park for transport and logistics. They will contribute to environmental friendly infrastructure arrangements like water management, waste water purification with reed land, open-trenches system and grey-water circuits, separated sewage system etc. It is also planned to evaluate the applications of businesses which want to go into the park in terms of their activities, employment, long term settlement, spatial requirements, sustainability (e.g. energy design, product use, water management) or timing. The business park will have good connections to the motorway but also to public transportation and new bike connections.

The arrondissement Leuven aims at the positioning as knowledge region together with the University of Leuven. The existing Science Park Arenberg has to be enlarged because of the demand of spin-offs and high-tech companies. Compared to the existing area which is an area of low density this new part is planned as an example of higher density of space with 4-5 building cluster on 12 ha land with 120.000 m² floorspace. With existing and new businesses clusters can be built and the University offers a range of high skilled work force. Additionally soft factors like the location in a green area support the settlement of business in this Science Park.

A common aspect in the Belgium Case Studies on Smart Business-Sites is the Park management. Beside the responsibility for construction and maintenance of public parks and places Park manage-

ment offers various services. It provides for supply and disposal and maintenance of infrastructure. This is financed by an apportionment for every company. The Park management in the existing part of Science Park Arenberg e.g. is changing the sewer in a storm water and waste water sewer and is remodelling the streets.

Other services of Park management can be:

- Construction and operation of buildings
- Services in information and communication
- Concerted organisation and purchasing of energy, phone services, disposal services etc.
- Maintenance of private areas
- Catering, organisation of events
- Child care
- Networking and contacts

This gives every single company financial advantages in purchasing and organisation but additionally it will create a positive business climate in the business park and a good image to be there.

(Delcart 2006; Intercommunale Haviland 2007; Consortium Haviland-Interleuven-Province Vlaams Brabant 2006)

What seem not to be smart in some Case Studies regarding Business-Sites are the demand of land and the use of greenfield. Particularly the existing Science Park has a very low density but it was built in a time when land-use was not seen as a problem.

Smart Working Practices

Smart Working Practices depend on another question of smart use of space and resources. It is aiming at an efficient use of existing floor space and work force. Therefore Smart Working Practices deal with technology and organisation supporting everyday work. It is a mix of behaviours, processes, procedures, systems and facilities. The UK Case Studies are about private and public organisations who aim at implementing Smart Working Practices. Besides the mobilising of workforce the aims are:

- Better service for customers and communities
- Better management and support for staff
- Better use of time, space and technology

A very technology-based example is the Vodafone Headquarters in Newbury. One reason to build a new headquarter was to concentrate headquarter functions which were spread over the town of Newbury in different properties. By this the internal communication could be organized in a better way. Other aims were the reduction of inefficiencies and creation of a working environment with opportunities for a better work/life balance.

Basic for the different offers of Smart Working Practices is a (nearly) wireless office. Independent of a place at a desk every employee has high-speed remote access to the company intranet, to email and offices applications and the internet by using mobile phones, blackberry or laptops. There are different touchdown points in communal areas which allow workers and visitors to access information. Services like printers, fax or copier are at central points at every floor and can be accessed from every point of the building. Beside these technological aspects the organisation of work is more flexible. Every employee works in an open-plan environment, there are no closed offices. Employees can choose home working, flexible working times and places.

In Surrey County Council they implemented the so called 'Surrey Workstyle'. Beside concrete aims like e.g. an overall workstation to employee ratio of 4:5 they

improve the office layout and design and the service for employees like tea-bars, central bookable meeting rooms, hot desking areas, etc. In Surrey County Council like Vodafone too they have only open-plan offices with standard furnishings and storage facilities.

In both Case Studies a key factor for success is seen in communications and trainings for the employees to overcome exceptions. The staff can have a lot of reasons to react sceptical or even negative. They have to give up their routine, open-plan offices break down hierarchical structures, they have to deal with more technology and they have to deal with more flexibility which means on the other hand more responsibility for self organised work. This is why implementing Smart Working Practices needs a clear leadership, careful managing and support and a lot of communication with the employees. The advantages are obvious: Vodafone has improved productivity, the communication and creativity have prospered and they are on the way to a paperless office. Surrey County Council has nearly achieved the workstation to employee ratio of 4:5 and can realise space-gains.
(Andrews 2006; Kelly 2004)

Conclusions and prospect

Smart Economic Growth must be seen as a complex picture with different actions on different levels and many stakeholders. Private and public business will have to organise work in a flexible and innovative way. Therefore they need a congenial environment which can be offered in Smart Business-Sites. For municipalities and regions the picture has further layers. They should aim at Smart Land-Use and will have to convince developers and business to deal with requirements like inner-city development, using environmental friendly and innovative techniques and measures. Both parts need information about objectives and demands of each other – something which is missing particularly in Germany in many regions. Only by bringing them together smart solutions seem to be possible as the Case Studies show. This all implies Smart Policies. Smart Policies can create a creative and innovative atmosphere where public and private sectors can realise their visions of development in a smart way.

The lessons German partners learnt so far especially from the case studies in Belgium and in the UK is that regional development and regional economy strategies should be combined with spatial planning strategies. Having a Park management like in Belgium is an innovative way of organisation of business-sites. The German Case Studies are more advanced in using brownfield and using environmentally friendly technology and designs.

The lessons learned from the Case Studies and the recommendations and ideas out of the Local Groups and the international working will be summarised in a kind of (digital) handbook (Smart Economic Growth Development Guidance SEGDEG). This shall be a toolkit and a good practice guidance including smart policies, examples of smart developments and smart organisations. It is expected that this will help planning practitioners, decision makers, business and professionals to develop their special smart solutions for an integrated land-management to fulfil the different needs and protect and encourage the fundamentals of further economic growth.

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3.4 The Integration of the Brownfield Remediation and Redevelopment Processes: The Relevance of the Information

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ABSTRACT

Promoting Brownfield redevelopment policy can simultaneously promote remediation of contaminated properties. This is one of the major opportunities to promote sustainable development in Europe. Both processes require the same information, which can be integrated to form a Brownfield Information System (BIS). This set of definitions, classifications, procedures, inquiries and indicators can streamline the Brownfield redevelopment process. This paper focuses on a possible BIS implementation in European countries and provides the first results from the Italian implementation of the Brownfield Information System.

Introduction

In Europe, industrial change has left many manufacturing firms abandoned in urban areas. These often contaminated properties are called Brownfields. Before Brownfield properties can be redeveloped the contamination has to be remediated[1].

Brownfield redevelopment is one of the major opportunities to contribute to and foster sustainable development. As a tool for creating future regional development policy, the redevelopment process can overlap with the remediation process.

Public authorities are faced with the expensive Brownfield remediation process and the constraints of a limited public budget. Therefore the public authorities must maximize the public interest within the constraints of the public budgets. Effective remediation tools require efficient allocation of these limited public resources and public/private partnerships by promoting redevelopment processes.

Redevelopment can be facilitated by a Brownfield Information System -- a set of definitions, classifications, procedures, inquiries and indicators. This compiled information can be used to effectively support Brownfield redevelopment by best allocating limited resources and facilitating private investments in order to reduce investor uncertainty. On the contrary, missing or inadequate information can create inaccurate and/or ineffective public choices for both the European Union as well as individual member nations. Inefficiency and misinformation can waste severely limited resources.

1 In fact, European brownfield networks define brownfields as: 'sites that have been affected by the former use of the site and the surrounding land; are derelict or underused; have real or perceived contamination problems; are mainly in developed urban areas; require intervention to bring them back to beneficial use' (Feber & Grimski, 2002).

This paper[2], stressing the information required for successful Brownfield redevelopment, focuses on a possible organization of the Brownfield redevelopment process based on different components for BIS implementation in European countries. In conclusion it will provide the first results from the implementation of the proposed BIS in Italy.

The Brownfield Information System (BIS)

The BIS must support a regional policy that aims to redevelop Brownfields rather than to develop Greenfields from scratch. Brownfield redevelopment policy is a process that can be organized into three phases -- each phase is a complex activity with its own objective. Complete development of these phases can maximize the public interest within the constraints of the private and public budgets by first identifying, collecting and then elaborating on the information with an end result of an official Brownfield redevelopment policy. Organizing the redevelopment process in these three phases identifies the objective of each.

The first phase is a preliminary evaluation of the size of the brownfield sites within a given country. The second phase is a drawing up of a regional Brownfield redevelopment plan that prioritizes Brownfield redevelopment actions. The final phase is the selection of a Brownfield redevelopment project that maximizes the preference of the involved stakeholders while best allocating limited public resources and promoting private investment.

The objective of each phase is complex and can be achieved by implementing effective tools into comprehensive yet regional policies. Since 2002 APAT (National Environmental Protection Agency of Italy) has promoted studies concerning Brownfield remediation and redevelopment tools[3] that can promote Brownfield redevelopment policies. In particular, the Agency proposes to estimate the size of the Brownfield redevelopment opportunities of a given country by starting from existing land inventories and integrating urban planning data with contamination data. To get a priority list of Brownfield redevelopment actions, the Agency suggests, and will implement in Italy, a tool prioritizing actions according to a preliminary evaluation of a Brownfield's potential re-use, based on a multi-criteria analysis. The tool consists in a Brownfield local reuse value matrix that allows the regional authorities to construct a regional Brownfield redevelopment plan. To select the best alternative project the Agency recommends the implementation of a Project Cycle Management model which it tested with two focus groups. The model promotes selection of the best alternative project that maximizes the preference of the involved stakeholders, best allocating the limited public resources and promoting the private investments. It also allows for collection of the acquired knowledge useful for improving future brownfield redevelopment processes.

The required information can be determined based on each phase of the redevelopment process. In particular, the integration between environmental and urban planning data necessitates site-specific information about the scale, the location and contamination status of a Brownfield. The tool to prioritize the Brownfield redevelopment interventions also requires, in addition to such site-specific information, regional information because the Brownfield redevelopment programming should achieve the objective of integrated and

2 This paper is the result of studies, which the authors, with working groups, have carried on in APAT since 2002. The views expressed are those of the author and the co-author and do not necessarily represent the position of the APAT.

3 These APAT studies were developed with two different working groups (WG). The first working group (WG1) was composed by APAT with CLES (a Centre for Research and Studies of the Problems of Work, the Economy and Development). The second one (WG2) was composed by APAT, the Department of Planning of the University of Venice (IUAV), the Regional Agency For Environmental Protection of the Lombardia region (ARPAL), the National Topsoil Center and Sviluppo Italia Aree Produttive (the national agency for enterprise and inward investment development). A synthesis of the APAT tools has been presented in the Conference "Green Brownfields III Regeneration – Innovative Concepts", Lerici (SP, Italy), October 8-11, 2006. Cianflone (with Di Marco & Di Toppa), Forthcoming.

sustainable land management (Grimsky & Feber, 2001). Then the information should concern all disciplines: environmental, socio-economic, and urban planning. The Project Cycle Management model, in addition to such previous phases, requires information about stakeholder preferences, remediation data, alternative projects, intervention costs and benchmark data.

In the following subsections, the information needs will be specified, stressing the current availability and the difficulty of proposing a possible end-use for them. This streamlined process for Brownfield redevelopment is summarized here in Table 1.

Table 1: Components to organize a Brownfield redevelopment process

REDEVELOPMENT PROCESS' PHASES	OBJECTIVES	APAT TOOLS	INFORMATION NEEDS
Preliminary Evaluation	Evaluation of the size of Brownfields of the country	Brownfield inventory	Specific site information: scale, location, former and current use of the site and contamination data
Regional Planning	Planning of the Brownfield redevelopment actions according a regional priority list	Brownfield local reuse value matrix to construct the regional plan	Further specific site, including the previous one and Regional information: urban planning, environmental and socio-economic data
Brownfield Redevelopment Designing	Selecting the best alternative project	Project Cycle Management Model	Including information of previous phases, further information about stakeholder preferences, recover and remediation data, alternative projects, intervention costs and benchmark data

Preliminary Evaluation Information

Estimated evaluation information can determine the potential Brownfield redevelopment opportunities. It is also useful for monitoring European Union's redevelopment policies.

It is necessary to know how many Brownfields are eligible for redevelopment in a given area as well as each site's economic potential for redevelopment. Therefore, the information collected should quantify the size and the location of each Brownfield.

In fact, the ratio of a Brownfield national area as a percentage of the total national area (Brownfield density) allows for evaluation of the size of the whole Brownfield opportunities providing a preliminary measure of a potential redevelopment policy. But this can be misleading if the Brownfield area data isn't supported by location data. The density depends on the distribution of the brownfields on the examined territory. In fact, low Brownfield density at a national level doesn't preclude a high density in a particular part of the country. Knowing the location of a Brownfield site can prevent misinformation about regional Brownfield density. [4]Another important indicator is the ratio between a Brownfield national area and total number of Brownfield sites. This allows for the calculation of the mean area of the Brownfield sites. This indicator is important in Brownfield redevelopment policy. It can be different if the Brownfields are small in number but great in area or vice versa.

But collecting this information can be complex. This is due to the strict dependence of Brownfield information on its definition. It includes urban planning information in terms of a site's former and current use, location, and contamination (either real, perceived, or potential). Usually these data are collected separately. So it often happens that either information set exists but it is difficult to know the sources or the data collection is driven by the definition or the sources are known but can't be integrated.

In Europe, a recent survey by Oliver, et al. (2005) shows that data is scarce. But this can be interpreted as a result of European

4 This has been the case in both France and Italy.

countries differing on what the definition of a Brownfield is. The existing information seems to depend on population density, competitiveness but also on the legal framework. Then it defines the redevelopment policy goals. This survey also shows trends in the definitions of Brownfields. Some countries refer to Brownfield sites as 'previously developed land', others to 'contaminated lands'. The interpretation of these trends distinguishes each country's redevelopment policies. The former national policy aims to redevelop already developed land because of the perception of land as a scarce resource. The latter national policy aims at remedying contaminated lands because land is not necessarily perceived to be a scarce resource and it is difficult to enforce the legal framework of contaminated lands. Both national policy aims should satisfy European policy requirements. Both policies should be taken into account.

These data, though not statistically useful, are necessary to quantify the parameters of a Brownfield site. This approach integrates the information and sources. Both situations reveal the clear need for individual countries to improve their information collection and organization processes and to make the data uniform so that the data is comparable across Europe. Countries that consider Brownfields 'previously developed land' can overlook information about the current contamination status of these sites. This information should be integrated into the urban planning information. Countries such as Italy that consider Brownfields 'contaminated lands' miss information about the urban planning issues of these sites as former and current use. Therefore, they should integrate them into data already collected about the contamination status. All countries should integrate data about area, location, and former and current use because they often neglect to track them.

The integration could be achieved by starting from existing land inventories. It is possible that countries that identify Brownfields as 'previously developed land' already have inventories about the underused and disused land. Countries that define Brownfields as 'contaminated land' can use available information about these properties. Starting from these inventories can save time and money and successfully provide a common definition of the Brownfield and an estimated evaluation of the size of each Brownfield site to guide redevelopment policy opportunities.

Starting with available information each country should research the following to estimate the redevelopment opportunity of each site:

- former use (agricultural, industrial, commercial and services)
- current use (in use, underused, disused)
- location (administrative name, area)
- contamination status (potentially contaminated, contaminated, environmental degraded)[5]

Even if the information is not exhaustive this method allows each country to estimate a current potential value of the Brownfield redevelopment opportunity.[6]

Regional Planning Information

Regional planning information allows for a regional priority list of Brownfield redevelopment interventions. Regional Authorities are faced with the remediation process within the constraints of a limited public budget. Therefore the public management must maximize the public interest within the constraints of the public budgets. To most efficiently allocate these limited public resources and to facilitate the public/private partnerships it is useful

5 A site can be defined contaminated according to the national law. A potential contaminated Brownfield is here defined as a site where contamination, as established by national law, is not still confirmed. An environmentally degraded Brownfield is a site where contamination doesn't need to be confirmed as it is documented to be affected by a former use. It won't need the remediation just intervention.

6 Details about that are provided in Section 4 of this paper -- showing the first results in Italy.

to first evaluate the potential reuse of a Brownfield.

Guidi & Liberatore (2004) developed a tool to determine the value of a potential Brownfield reuse.[7] This tool provides a Brownfield local reuse value matrix (table 2) that allows the regional authorities to construct a regional Brownfield redevelopment plan (RBRP). As mentioned above, using this tool requires a preliminary collection of information.

In particular, the preliminary evaluation of the potential reuse requires information that considers disciplines from all involved stakeholders in a Brownfield redevelopment. The information set should also concern regional information not just the exact location of a Brownfield site. The context size depends on national planning needs and the availability of the statistical data.[8]

Additional information should include environmental and socio-economic data such as site-specific information like accessibility to the site referred to the infrastructures data, distance from the centre of the urban area, legal bonds, and environmental bonds. Regional information should include environmental information measuring the relevance of the Brownfield in environmental point of view, socio-economic value information concerning demographics, employment and economic activity.

The information should be used to fill in checklists that evaluate the redevelopment aptitude of each Brownfield. This method categorizes the brownfield in three homogenous groups according to three identified reuses:

- green area reuse
- public amenities reuse
- income activities reuse

These groups can be organized by a multi-criteria analysis that allows for three synthetic values for each Brownfield – one for each alternative. For each Brownfield, the highest value represents the priority redevelopment alternative -the best alternative use for that Brownfield (Table 2).

Table 2 Brownfield Local Reuse Value Matrix

Where: Vi,j (i=1…n; j=1,2,3) is the synthetic local value of aptitude of the site i-th for the alternative j-th, obtained by multi-criteria analysis. It varies between 0 and 1; n is the number of the Brownfield sites of the RBRP.

Alternative (j) / Size (i)	1 (green use)	2 (public amenities)	3 (income activities)
1	$V_{1,1}$	$V_{1,2}$	$V_{1,3}$
2	$V_{2,1}$	$V^{2,2}$	$V_{2,3}$
…	…	…	…
i	$V_{i,1}$	$V_{i,2}$	$V_{i,3}$
n	$V_{n,1}$	$V_{n,2}$	$V_{n,3}$

The Public Authority can construct the RBRP by ordering the results. This hierarchy can thus be established:

1. The order of the sites depends on the size of the value and indicates the priority aptitude of the sites.
2. The financial value of each alternative and the likelihood that that site will be redeveloped for that alternative use.

In any case, before the final definition of the RBRP, it should useful to verify:

- committed, requested, and potential financial (public and private) resources to earmarked for the RBRP, in order to compare them to estimated intervention costs;
- earmarked resources for the immediate remediation interventions, in order to deduct them from the previous estimated amount.

7 The tool was developed by APAT WG1 (APAT, 2004) and was really built to preliminary value the potential contaminated sites and prioritize the remediation intervention, but it can be used also in the case of Brownfield as previously defined.

8 e.g. in Italy to measure the socio-economic context it is possible to refer to the Local Work Systems (in Italian SLL) data provide by ISTAT (National Statistical Institute of Italy). A SLL is the set of continuous Municipalities, which is determined on the base of economic relationship between the Municipalities.

Brownfield Redevelopment Designing Information

The Brownfield redevelopment designing information can allow for selection of the best alternative project. The Brownfield redevelopment designing is the last phase of a complex decision-making process. The goal of the redevelopment process is the best allocation of limited public resources while minimizing the burden on public/private investors. But the Brownfield designing has to promote equitable distribution of the public good. Brownfield redevelopment should aim to reduce or eliminate health and environmental risks that threaten the common good. Brownfield policies must aim to equitably distribute any potential benefits because redevelopment has distribution consequences that can affect the public positively or negatively.

The designing phase is more complex than an ordinary real estate transaction. Brownfield redevelopment is typically more expensive with more involved stakeholders.

The Public Authority should manage the decision process with input from developers and all stakeholders involved to choose redevelopment projects that best allocate limited public resources and promote private investment.

In this complex phase, the information concerning Brownfield redevelopment designing go besides the ordinary information needs both in detail level and in relevance for a Brownfield redevelopment policy. In fact, the detail level of the regional information, previously collected to construct the regional plan, need to be higher, consider the context of the Brownfield and not only the site but valuate the surrounding land both in supply and in demand side. Then, in a long run view, become relevant also an adequate collection of built knowledge, which need to diffuse. In fact, the past experience information assume itself an important role in supporting and facilitating future redevelopment policy both in Europe and in single countries.

The Public Authorities need information about the estimated costs and benefits of alternative projects, including the distribution effects of each. It is necessary to include the collected information in the planning phase, further information about the technical and financial implications of a given project. It also requires further stakeholder preference information, potential alternative projects and data from the benchmark Brownfield redevelopment to catch solutions from the similar situation.

The public authorities should implement the model that makes any acquired information available to all stakeholders. This can prevent inefficiency and inaccuracy in future development policies.

APAT developed a model based on a project cycle management approach (Gibin & Turvani, 2006), for the identification and formulation of Brownfield remediation and redevelopment aimed at establishing benchmark data. The model also takes into account the need to build and diffuse the acquired knowledge. It is a model for Public Authorities and defines the tasks of the decision-making process, the stakeholders involved in the process, the information to collect and the knowledge to be built upon, and the tools and the criteria to use for the evaluation of the alternatives. The model is an incremental decision-making process: the decision is the result of interaction between different subjects, each one with its own aim and strategy. This interaction produces a common redevelopment goal for the project. Identifying a common problem and a common solution (and therefore a project) depends on the quality of the interaction between the stakeholders and the capacity of the Public Authorities to cooperate with the stakeholders. The result of a managed decision-making process is the "Accordo di Programma". Subject to agreement by the parties concerned, it defines commitments: financial liability of

private investors and developers and the planning decisions of the Public Authorities. The model consists of two phases. The former consists of collecting the information about the Brownfield, organizing the problem-solving, constructing the problem solving. The latter consists of decision making. Of course, the model needs supporting information, analysis, etc. In particular, the model needs two tools (ibid). The first is a geographic database to classify the redevelopment Brownfield to project according to social, environmental and economic aspects. This is a software application for geo-marketing that public authorities can use to spread information on Brownfields and promote public-private partnerships. The second is a set of normative and operational tools, financial tools, project valuation methods and analysis, and support methodology for decision making.

The implementation of the BIS in Italy: Preliminary Results

An investigation into Italian Brownfield sites (Cianflone & Di Toppa, 2006[A]) shows that contaminated land is not always an actual Brownfield, as defined in Europe but a similar European definition is used in the debate over disused sites. The nature of the Italian Brownfield is the same as a European Brownfield: the process of industrial change. At the same time, the priority set of Italian Brownfields to be redeveloped has a broader scope: potentially contaminated or contaminated because of the difficulty and expense of enforcing the Polluter Pays Principle, due to the indetermination or inactivity of the polluter in the remediation process.

So, the Italian Brownfields with redevelopment priority can be determined by the intersection of the contaminated lands needing remediation and disused sites which needing redevelopment (Figure 1).

Figure 1: The set of Italian brownfield with redevelopment priority

With this in mind it is important to stress that a complete set of Brownfields, according to the European definition, should also include disused sites that are neither contaminated nor potentially contaminated, but just degraded (and requiring intervention). In fact, these Brownfield sites should be redeveloped rather than developed as Greenfields. The above intersection of Italian Brownfields (Figure 1) illustrates redevelopment priorities.

In order to preliminary evaluate the Italian Brownfield sites, a study of 50 contaminated sites of 'national interest' [9] was conducted (Pietra, 2006). 72% of the properties are Brownfields. They are affected by former industrial use, located in urban or sub-urban areas, in particular, 15 are located on the coast (tables 3 and 4).

Table 3 Brownfields in the list of contaminated sites of 'national interest'

Notes: (*) chemical, petrochemical, iron and steel industry. They prevalently include waste disposals sites. (**) estimation.

Information	Results	Unit	Data
Former use	Industrial (*)	number	36
Current use	In use	number	11
	Underused	number	10
	Disused	number	15
Location	Urban and sub-urban	-	-
Contamination status	Potentially contaminated	hectare	180,000 (**)

The inquiry also investigated contaminated sites of 'regional interest' through a survey sent to the Regional Environmental Protection Agencies and the Region Authorities. The survey sought information on contaminated and potentially contaminated land affected by industrial or former commercial use, currently disused or underused land. The requested information covered location, area and

9 In Italy, some contaminated sites are considered to be of 'national interest' and are protected by law.

current remediation status.

While additional data is still necessary, the survey has already yielded useful information. The respondents started with the contaminated land inventories and combined them with other requested information, including former and current use.

As illustrated in Table 4, 60% of Italian Regions have provided data about the number of Brownfield sites in their region. This highlights the growing interest in Brownfield redevelopment in Italy. Not surprisingly, the concentration of the Brownfield is in Northern Italy though they are located throughout the country.

Table 4: Italian Brownfields per Region and Autonomous Province

Region/ Autonomous Province	Brownfields of 'Regional Interest'		Brownfields of 'National Interest'
	Number	%	Number
Piemonte	40	3.9%	3
Valle D'Aosta	2	0.2%	0
Lombardia	690	66.7%	6
Trentino Alto Adige	-	-	1
Provincia Autonoma di Bolzano	-	-	0
Provincia di Trento	33	3.2%	1
Veneto	-	-	1
Friuli Venezia Giulia	-	-	1
Liguria	-	-	3
Emilia-Romagna	2	0.2%	2
Toscana	192	18.6%	3
Umbria	19	1,8 %	1
Marche	18	1,7 %	1
Lazio	6	0,6 %	0
Abruzzo	-	-	0
Molise	-	-	1
Campania	4	0,4 %	2
Puglia	-	-	4
Basilicata	13	1,3 %	2
Calabria	-	-	1
Sicilia	15	1,5 %	2
Sardegna	-	-	1
Total	**1,034**	**100,0 %**	**36**

More than 1000 Brownfields are now documented so Italy has a growing opportunity to set policy goals for redevelopment. The number of Brownfields is most likely under-reported because some regions are still collecting and submitting data and some disused (but non-contaminated) sites still haven't been documented as Brownfields. Current information for these Brownfields can be inconsistent as they do not cover all Italian regions and they miss contamination status data. Even these incomplete inventories highlight the increasing interest of urban planners in these sites.

Even though the current inventory of Italian Brownfields underestimated the absolute number of Brownfields and still requires more information, it is still useful because it confirms the opportunity to use existing inventories in order to achieve comparable data across Europe[10].

APAT is going to implement the proposed Brownfield local reuse value matrix in the Region of Marche. In particular, the implementation concern a brownfield located in Ascoli Piceno -- a municipality of Marche. It is a work in progress that has already yielded useful results: multi-agency collaboration between Ascoli Piceno Municipality, Province of Ascoli Piceno, Marche Region, Regional Environmental Protection Agency of Marche. The study will be a good test to evaluating and improving this process.

APAT still hasn't implemented the project cycle management model but two focus groups tested it for utility, applicability and enforceability (Gibin, 2006). They interviewed experts from the public and private sectors specializing in remediation and redevelopment.

The main result of the two focus groups is the belief that the manage-

10 In fact, in the aforementioned European survey Italy was one of European countries that identifies Brownfields as contaminated lands even without data about the scale and description of the properties, (except for the Lombardia region and the municipality of Milan)

ment of the decision-making process is an adequate tool to facilitate the redevelopment and the remediation of Brownfields. They consider it to be consistent with the goals of the redevelopment process. Anyway, just the implementation of the model can validate it. This is the next step for APAT to promote.

They also conducted a survey of previous Brownfield redevelopment actions in order to verify the availability and the current collections of the acquired knowledge information needed to improve future redevelopment processes (Cianflone & Di Toppa, 2006[2]). They reviewed four case studies. But perhaps the most relevant result is the scarce amount of collected information. The current information inventories are characterized by focusing on results of chosen projects instead of stressing the implemented actions, tools, analysis and methods that promote the public good. The collected information often overlooks environmental information and their relevance. There is little information available on the contamination status and remediation procedures, technologies and costs, respectively followed, used and beard. These results increase the value of implementing the Project Cycle Management model proposed by APAT.

Conclusion

A Brownfield Information System can drive the Brownfield redevelopment process. European countries should earmark resources to establish their own BIS. Organizing the redevelopment process into different phases can identify the best compilation of information and each phase requires a different information set. The redevelopment process requires more detailed information as it progresses. Then the information relevance changes according to the objective of each phase. So the information set is itself a process of ordered activities. Each one requires the enhancement of the previous one.

It is useful to remember that each information inventory should take into account the relevance of the integration of information. The information must satisfy all stakeholders involved in the process. This can make inventorying Brownfields difficult but this doubles the benefits derived from integrating the redevelopment and remediation processes. Therefore Brownfield redevelopment requires a BIS.

Finally Italy's first BIS implementation efforts highlight the importance of European Brownfield networks by promoting the networking of Brownfield redevelopment and remediation information. Through stakeholder cooperation Brownfield redevelopment can launch sustainable development throughout Europe.

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3.5 Participatory Planning and Attractivity in Tension: The case of Brussels

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ABSTRACT

During the last decade, new procedural devices have been developed to stimulate the renewal of large brownfields that Brussels includes in its very heart. Since last year, a new public instrument, called 'schéma directeur' (structure plan), is being used to plan the future of important zones that could serve as 'lever' for the development of the Brussels Capital Region. Its originality is supposed to be two faced: far more participative than traditional urban planning (integrating the opinions of diversely concerned local actors) and at same time more effective. Our core question is thus the following: how does the 'schéma directeur' deal with the tension between territorial attractivity (in economic terms) and the need of social inclusion? To document this question, we shall make explicit who are the actors of the participative device, their purposes and means, under which conditions their voices are heard, and what is the outcome of the procedure in terms of improvement of the planning quality, effectiveness and legitimacy.

The Brussels context

The quasi-disappearance of the large undertakings of the industrial era, the other consequences of the economy's globalisation, and transformations of the figure and roles of the State have left their marks on the urban landscape of Brussels as elsewhere (see Dogan and Kasarda 1988 ; Taylor 2004 ; Sassen 2006). The gradual institutional overhaul of the Belgian State, which has become federal and been split territorially into "Regions" but also linguistically into "Communities", explains as well why a certain number of large or architecturally or situationally important industrial wastelands and derelict areas are to be found in the very heart of the bilingual Brussels-Capital Region.

Their number, size, and importance give these areas or sites' fates decisive importance for the future of the Brussels Region. Yet, over the last decades they have been the subjects of multiple controversies, as a result of which their conversion to other uses has been considerably delayed, failed, or even simply prevented. Depending on the case, these quarrels concerned the sale of formerly public property and the conservation of a contested architectural heritage in a motley urban landscape already ravaged by "Brusselization" (ref.). They also concerned the re-zoning of these areas or the redefinition of the functions that they must fulfil to guarantee a changing urban region's redevelopment. More specifically, the financial survival of this region seems to depend now more than ever before on its ability to retain the middle- and high-income residents who might be tempted to flee the city and to attract new ones.

That is why the regional public authorities have gradually tried over the past ten years or so to set up new instruments of public action that are both more effec-

tive operationally and more consensual socially. The idea was effectively to shake off a certain inertia, that is to say, to dynamise regionally more consistent urban development. Given the context of intensified rivalry amongst the towns and regions of Belgium and Europe, the stakes riding on making the Brussels-Capital Region more attractive to various categories of investor are very high indeed.

At the same time, the regional authorities also wanted to avoid repeating some of the errors of the past. In the decades after World War II some major projects carried out by public authorities alone (sometimes in association with private promoters) had effectively triggered some memorable "urban struggles" concerning above all the need to preserve housing for the least advantaged segments of the capital's population. In this respect, the recent transformation of Brussels' urban public policy has been accompanied moreover by the redefinition of the positioning of associations that were formerly considered more anti-establishment (see Corijn and Groth 2005). New associations have also come on the scene to take part in a number of large public urban renovation projects.

This trend was institutionalised in the early 2000s through its inclusion in the regional governmental programme. The Regional Development Plan (RDP) of 2002 thus defined fourteen sites of major importance as being "areas of regional value" (ZIR in French, GGB in Dutch). The successful conversion of these areas was supposed to "leverage" the Brussels-Capital Region's development. Now, this conversion involved implementing a new tool, the "structure plan" (schéma directeur or richtschema). Through this structure plan, the public authorities intended to include all of the parties – federal, regional, and municipal institutions; private investors; local players; and associations – that might be concerned by these ZIRs' renewal and re-use and the developments that they induce in and around the sites when it comes to community facilities, mobility, and transport, to cite just a few examples in the process of setting the ZIRs' major redevelopment axes.

In theory, the idea was to ensure more urban development that would be more efficient, that is to say that would enhance the city's economic and territorial attractiveness, but would at the same time be socially more concerted. All of the parties concerned, including the people living on the edges of the derelict sites, were thus expected to participate in drawing up the project. This concern was doubtless fuelled by the turn-around in public policies that was inspired by the new forms of governance (see Le Galès 1998). However, this imperative also met a political, if not ethical, concern. It was effectively important that Brussels' economic redevelopment not take place to the detriment of a certain socio-economic diversity, a mixture of people from different walks of life that had long characterised a cosmopolitan capital harbouring some of the European Union's main institutions. (see Hein et al. 2006).

Participation in question

This is the context in which a research group called "Groep Levier" (Lever Group) was formed. This group was composed chiefly of social scientists, architects, town planners, and Dutch- and French-speaking associations and set out to analyse the various stakes riding on current developments in and the futures of the "lever areas" and to study the new instruments being made available for their development.

The Lever Group was thus able to follow the elaboration in 2006 of the first Brussels structure plan for the "Botanique" area. This plan concerned, amongst other things, the renovation and re-utilisation of a former complex of administrative buildings (the State Administrative Complex), which was a grandiose vestige of Belgium before its federalisation that had been sold cheap to some private investment companies. It also concerned the

redevelopment of the site per se and its surroundings, located in the heart of Brussels, on the edge of its historical centre.

Even though this research group took up the task of studying other "lever areas" for which structure plans were foreseen or on the verge of being drawn up from the very beginning, in order to compare the various zones, the observations of and analyses based on this first use of this tool will be the subject of my presentation. More specifically, I should like to lay the foundations of thinking about the tension that exists between the two central objectives of Brussels' development as they were defined by the political players and regional institutions, namely, territorial attractiveness or economic competitiveness, on the one hand, and socio-economic mixing, inclusion, even social justice on the other hand.

We effectively know that the two are far from necessarily found hand in hand. Let's take just one example, concerning a major aspect of regional development, namely, improvement of the housing function. From the regional priorities standpoint, the aim was roughly to base the lever areas' rehabilitation on renovating or rebuilding housing and redefining community facilities (shops, services, transport, and so on) likely to attract or keep middle-, even high-, income residents in the Brussels Region. However on the other hand, the aim was also not to harm the more disadvantaged groups already living on the edges of the derelict sites and to protect, even improve, their quality of life, or at least that is the message that the politicians put across.

Ideally, large urban development projects strive to achieve both types of goal together by setting up an innovative arrangement of procedures and participation. That was one of the areas of reflection opened up by the Lever Group's first round of work, to wit, to what extent and under what conditions did the structure plan, through its simultaneously procedural and participatory nature, make it possible to reconcile contrasting and sometimes almost incompatible objectives?

Trying to answer this question will require joint study and cross comparisons of various experiments yet to be done of the structure plan in lever areas with different characteristics, especially when it comes to their locations, public or private ownership of the buildings and land, and their architectural qualities. Such an assessment obviously is not possible at this stage, since the regional authorities have just approved and unveiled the first structure plan to the public. Nevertheless, this first experience has already offered fertile ground for observation and analysis and enabled the group to clarify the contours of one key question, that of participation. For the participatory nature of the envisioned procedure and the regional scale of the development project that it serves are effectively what constitute the innovative aspects of this new urban policy from the outset and which are supposed to determine its success in terms of territorial "attractiveness".

The entire question then becomes that of knowing whether the structure plan actually does allow all the parties potentially interested in participating in drawing up and carrying out the major projects associated with the lever areas, including residents and users, to do so, to make their respective concerns and wishes known before the decisions affecting them are taken, and with what results. It thus becomes important to study

1. how participation is defined or perceived and, if relevant, experienced by the various players in the successive stages of the process;

2. how and by whom the various parties, players, and/or participants are designated in the various stages of the process;

3. what ways and means are initially foreseen and actually implemented to organise this participation; and

4. finally, what are the actual and expected effects of said participation on the development project that is actually designed, on the monitoring of its development at a later stage, on the actual achievements that ensue, and on the democratic legitimacy of the decision-making process.

The Botanique structure plan: initial observations

We thus tried to organise our first thoughts along these major lines of questioning. As I have said, at this stage these thoughts are the fruit of observation and analysis of the participatory procedure that ended recently – at least as far as its first phase is concerned – with the official approval of the structure plan drawn up in 2006 for the Botanique lever area.

This structure plan, which was commissioned by the Brussels-Capital Region's government and produced by a research consultancy selected through a European call for tenders, was originally conceived of as a methodology or procedure, not as a plan. It was supposed to set the major town planning guidelines for the Botanique area's conversion through an approach that banked on efficient consultation and exchanges amongst the parties that were concerned. These were the Brussels-Capital Region, which commissioned the project, the consultancy in charge of designing it, the private partners who had become the owners of the empty buildings at the heart of the site, the Brussels boroughs (communes) over which the ZIR spread, the federal and regional transport companies that serve the area, the inhabitants and institutions of the surrounding neighbourhoods, the users who travel through the area or work nearby, and finally an array of more or less strongly instituted associations, including the association mandated by the Brussels Government to mobilise the players, to organise the consultations, and to play the role of mediator in the multipartite consultation procedure.

It was decided that this procedure had to comprise a series of steps, including public meetings open to everyone and workshops, marked by meetings of a smaller committee that was supposed to pull the results of the consultations together. The perspective bandied about thus seemed to be one of great openness when it came to defining the participants and choosing the town planning guidelines. This project could also seem to be founded, as least from the plan's commissioners' and designers' perspectives, on an acceptation of participation that was proactive – from the standpoint of mobilising the parties concerned – and sometimes maximalist – given that participation was associated with the idea of consensual co-decision-making. In certain respects, the structure plan seems to have disappointed expectations on this point.

The first test of this tool has clearly triggered questions as to its participatory dimension. I shall try to summarise these questions in what follows.

The ambiguities of the notion of participation

As in many recent experiences, it is difficult to decipher the notion of participation mobilised in the structure plan. Was it truly a procedure aiming for "coproduction" or "co-decision making", that is to say, joint project development by the authorities and people? Was it rather the Belgian notion of "concertation" (multipartite consultations) in the strict sense, meaning that only a few parties decide, but after collecting everyone's opinions? Was it more of a "consultation", in which decision-makers take the opinions of those who are concerned into account, but only on some problems and not on others? Or, finally, was it (merely) a matter of "communicating" or "informing", that is to say, explaining or at most justifying decisions that are actually taken elsewhere, in a small circle, to certain "players" such as the residents?

In the case under study, the political level's

ambitions and expectations regarding this participation are particularly fuzzy. The call for tenders merely contented itself with including "consultation of the population" amongst the consultancy's tasks. Moreover, in the specific terms of reference, the role of the association chosen by the Region was spelled out in the following terms: "to facilitate concertation [i.e., multipartite exchanges] between the residents and Government of the Brussels-Capital Region"; to organise "the consultation of the various players' representatives", or the "consultation of the players" or "of the population", or even consultation "conducted in the form of in-depth interviews of the strategic players, work in select committee meetings under the oversight committee and broader communications (general assembly or the public at large)" (see http://centres.fusl.ac.be/GL/document/Reunions%20Groep%20Levier/06-05-03_b%29Note%20particip.pdf).

Careful observation of the public procedure itself and the interviews of the project's designer and main people in charge of the project within the regional government and the private investment companies that owned the site reinforce this impression of ambiguity concerning the definition of participation and the project's commissioners' and designers' expectations even more. This ambiguity is indeed revealed quite clearly in the other players' discourse, especially in the criticism and suspicions voiced by some of the "residents".

It appears that at least three preliminary questions were not clarified by the political decision-makers or by the town planners that they appointed. These were, "What is expected of the participation in terms of the project's aims? What is its scope or what is ultimately subject to the participatory procedure? And, first and foremost, who are truly the "players": How is the "participant" defined? This brings me to a second set of observations.

The ambiguities of the definition of the players cum participants

The way things unfurled, the way the "participants" were appointed through the structure plan drafting procedure raise some questions at the very least.

First, we can wonder about the exclusion, achieved very early on, of the users of the site and its surroundings and, in general, the absence of certain regional players, such as some older associations with more markedly critical attitudes, in favour of almost exclusively local players. This first trend reveals moreover a certain paradox: Why focus almost exclusively on mobilising local players when the development project does indeed tie into the much large scale of the entire Region, and even beyond?

Second, the definition, even the reduction, of the local players that was effected by the preferential use of the category "inhabitants" (or residents) is also highly revealing. It attests first of all to a tendency not to make distinctions between different categories of local players (simple residents, shopkeepers, owners, institutions, and so on) whose interests and means of all sorts are in reality highly differentiated. It also reveals a relatively "atomised" conception of local players. They participate (or do no participate) in the participatory procedure as individuals. In the absence of neighbourhood committees, the election of representatives who might be better able to voice the arguments and defend the interests of the weakest players (the residents of council housing, for example), is not facilitated. There is even a tendency to avoid doing just that.

Third, this relative atomisation of the "residents" player feeds a general tendency to distinguish between the players who have clout or who count, other than the project's commissioners and designers, and the others, whom the former are inclined to use. In the case that we studied, the private promoters, whose interests and plans very quickly clashed with the

draft structure plan submitted for multipartite consultation, made an eleventh-hour attempt to rally the "residents" to their cause by presenting an alternative project in a form (pictures and models) that could not help but be more understandable and appealing than a plan or programme.

Far from being as "consensus-based" as it was expected to be beforehand (and even described afterwards by the authorities, politicians, and a fraction of the urban associations in Brussels), the "participation" in drawing up the "Botanique" structure plan clearly did not erase the importance of the balances of power and alliances of interests between players. The structuring and evolution of the latter explain in particular a certain failure of the procedure to stay on track.

Participation: a curtailed procedure and façade?

It thus seems that two coalitions of interests formed around a strong opposition, namely, the research consultancy's project, backed up mainly by the regional authorities and political players, versus that of the promoters, who tried to rally a fraction of the "residents" to their cause. We can thus hypothesise that the political will to have the consultancy's project approved by the Region within the foreseen deadlines explains why the last phase of the consultation procedure was cut short, for the planned third town meeting or "Ateliers de la Cité" did not take place.

It is also clear that this balance of power contributed to the taking of the decisions about the major town planning guidelines of the structure plan in the wings of the consultation procedure, or at least outside the open or town meetings for which the procedure provided. It was as if the participatory "act" was being played on several stages at the same time: On the one hand, the coalition of leading actors "decided". On the other hand, the supporting actors seemed to be relegated to the roles of extras whom one informed, who asked questions, and whose proposals were not listened to unless they concerned points of detail that did not challenge the broad lines of a preconceived project.

The structure plan: Which subject of participation?

As I said earlier, the structure plan for the "Botanique" lever area was aimed at setting the broad lines of the future redevelopment of the "State Administrative Complex" site and the surrounding public areas, broad lines that were supposed the guide the renovation worksites for the next ten years. According to the project that was submitted by the research consultancy that the regional authorities had selected, the various parties concerned, be they "authorities", "players", or "partners", were supposed to come to an agreement in slightly over six months on the major town planning directions the renovation was to take. These mainly concerned the structuring of the space and the public facilities and their functions. The final version of the project was also supposed to emerge as the multipartite consultation process progressed, taking the criticisms and suggestions made by certain players, including the "residents", on board in the process. In this regard, too, we can take note of the structure plan's relative failure to fill its participatory role in terms of both the consensus for which it was aiming and the concerted nature of the project's development.

From the consensus point of view first, whilst the authorities were able to delight over the fact that the structure plan was indeed finalised within the planned deadline, it is not that certain that the plan was agreed upon by all of the parties concerned before it was officially approved. Indeed, the last phase of the procedure revealed a deep "dissensus" over the options that the consultancy favoured more and more clearly. The private promoters, who were patently "leading actors", then expressed their disagreement rather forcefully, albeit somewhat late, and proposed an "alternative" project that radi-

cally challenged the guidelines that were eventually chosen, despite this major controversy.

While the Botanique lever area's structure plan did not garner a broad consensus, as some claimed, it is even more doubtful that its development was the fruit of the public consultation procedure that it nevertheless instituted. At the end of the day, the criticisms and proposals that came out of the public consultations appear to have had little influence on the plan's development. It is true that the consultancy's preferred "basic option" set very narrow boundaries around what could come under the scope of concerted co-decision making right from the start. This option, which was dubbed "patrimonial" (i.e., the "legacy-oriented option"), consisted in conserving and making use of the site's modernist and functional architecture. It thus entailed conserving the "stone slab" architecture that characterised the site and transforming the existing built-up areas rather than rebuilding them. In a word, it left little room for multipartite consultation and co-decision making right from the start, when the structure plan aimed merely to set the broad lines of the project.

To the extent that the political authorities chose the research consultancy in charge of the Botanique structure plan precisely in line with a certain vision of the city, we can think that it was also up to the political authorities to gauge the limits on defining the scope of the participation that the preferred basic option implied. When certain choices can legitimately be made before the participatory process even begins, the political authorities must first and foremost make these choices known, along with the constraints that they entail and exactly what they leave open for public scrutiny and consultation, at least if they expect people to perceive the "new urban policy" to be truly more democratic than the old one, and rightly so.

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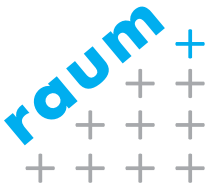

An Initiative of the Ministry of Environment and the Ministry of Economic Affairs of the Federal State of Baden-Württemberg, the Verband Region Rhein-Neckar, the Regionalverband Mittlerer Oberrhein, the Regionalverband Nordschwarzwald, the Regionalverband Südlicher Oberrhein, the Regionalverband Hochrhein-Bodensee, the Verband Region Stuttgart, the Canton Basel-Landschaft, the Swiss Federal Institute of Technology - Institute for Spatial and Landscape development (Lead) and the University of Karlsruhe - Institute of Urban and Regional Planning

Cross-border Sustainable Regional Land Management

The efficient use of land is the key aspect of every sustainable spatial planning and spatial development strategy. Central European countries facing stagnating or even decreasing population are still struggling to limit further expansion of settlement areas. Countries like Switzerland and Germany are currently adopting a spatial development strategy, which allows combining economic growth with limitation of settlement areas on the mid-term and long-term perspective. This can be achieved by following the principle of "internal development before external development", regional land management and complementary city networks. In a cooperation project among several regional planning authorities in the southwest of Germany, Ministries of the State of Baden-Württemberg, the Kanton Basel-Landschaft, the University of Karlsruhe and as lead the professorship for spatial development at the Swiss Federal Institute of Technology are exploring cross-border sustainable regional land management.

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3.6 Creating Young People Friendly Neighbourhoods

Peter Morgan

ABSTRACT

Greater consideration should be given to young people's needs in the processes of urban development and regeneration, to ensure they have suitable places to explore, express themselves, interact, or learn about their environment. Formal play areas are commonly standardised, unimaginative and isolated from where young people live. Busy roads and perceptions of 'stranger danger' mean young people are increasingly accompanied by an adult or driven by car, thus the outdoor environment is perceived as alien and dangerous. Over the last few years these matters have increasingly occupied UK public policy development. Action is required on many fronts: urban planning, the design of play provision, consultation methods, approaches to risk and our wider cultural attitude towards young people. There is increasingly an appetite for change, but we're still learning how best to make a difference. Groundwork is at the forefront of this work and can point to practical examples illustrating movement in the right direction.

Introduction - What is The Issue?

Groundwork's central thesis is that while the overall lot of young people within the western hemisphere has improved immeasurably in the last century (e.g. in terms of life expectancy, freedom from disease, starvation, childhood labour etc.) in one key respect at least, the trend has been in the wrong direction. This relates to young people's loss of freedom to explore, discover and interact with their local environment. Vehicular traffic, modern urban design and fear of strangers have together conspired to drastically narrow the options for young people to get outdoors, to meet with their peers, to play, to experience the natural world and to take risks.

This paper examines the multiple and profound negative effects of this trend. It cites recent UK policy work on this issue carried out by a number of organisations, including Groundwork, and profiles some case studies demonstrating how we can start to redress matters. Finally, it advances a number of recommendations if all our efforts in the fields of regeneration, renewal and development are to create places where young people can truly reach their full potential.

The author would like to fully acknowledge recent work carried out on behalf of Groundwork by Ken Worpole, Bernard Davies, Kate Stanley and Corinna Gamble. This paper draws considerably from their research and analysis (Davies et al, 2005), and from that of the consultant Tim Gill and The Children's Play Council.

How have we got here?

It's not that developers, urban planners or regeneration practitioners have deliberately sought to marginalize young people. It's simply that those engaged with these

processes have rarely stood back and really examined how young people will be affected, let alone sought the actual views of local young people. The insidious effects, over time, are urban environments that might be characterised as follows:

- Dominated by traffic and transport infrastructure. In the battle for street space between the car and children, the car has won. While UK road traffic fatalities have fallen in recent years, this is in part due to the fact that young people have retreated from the streets to avoid traffic danger – there are simply fewer youngsters out and about for drivers to hit nowadays! Furthermore, because of traffic danger, young people's licence to make journeys on foot is severely restrained by concerned parents. The number of children driven to school in the UK has rocketed in the past decade, generating yet more traffic, greater road danger, and indeed more CO2.

- Designed with inadequate consideration for young people. This may seem paradoxical as many of the individual elements within a regeneration scheme will frequently be investments specifically for the benefit of young people – the school, the formal play area, the children's section of the newly refurbished library etc. What is so often completely absent is an analysis of how young people, in different age groups, can interact with their neighbourhood as a whole, how they can easily and safely get from place to place and how, as they get older, they might increasingly do this on their own or with peers independent of adults.

- Island households. Recent social trends have led to increasingly isolating lifestyles, whereby residents have little engagement with their neighbours as each goes about their daily routine, driving to and from work, with little time spent in shared public space, and little likelihood of encountering neighbours. Even immediate neighbourhoods have therefore tended to become a largely unknown territory – to adults and young people alike – a mysterious street lay-out housing mysterious strangers. Somewhere best avoided.

- Captive and sedentary children. The combination of traffic danger and perceived or actual absence of friendly neighbours leads to parents severely restricting their children's freedoms. Childhoods are increasingly spent indoors. Fear of what's outside, along with the allure of modern media and games based indoor entertainment has led to more sedentary lifestyles. The resultant lack of physical exercise is now a major health concern and one of the root causes of a childhood obesity epidemic that is occurring within the UK.

- Risk aversion. It is of course entirely sensible to behave, and encourage others to behave, in ways that avoid unnecessary risks to our health or physical well-being. Life however can never be entirely risk free and many commentators have suggested that in the name of promoting public safety we're now producing a generation of young people ill prepared to deal with risk. This is because they've had so little childhood exposure to it as institutions, perhaps concerned about possible litigation, have banned activities and games that a generation or two ago would have been part of every day life for children. Climbing trees, playing conkers, having snowball fights or making ice slides are but a few examples.

- A disconnect with the natural world. There are many vital learning opportunities associated with free outdoor play and exploration, espe-

cially in natural or semi-natural settings. These include learning to deal with unfamiliar situations, assessing and handling risk and developing the skills and confidence to interact with and enjoy nature. Being denied these opportunities takes away the vital hands-on experiences that help young people to develop a deeper understanding of nature, of natural processes and of how the world works.

What should our aspiration be?

Research shows that two-thirds of 9-11year olds in the UK are dissatisfied with the quality of outdoor play facilities where they live; for 15-16 year olds this rose to 81%. A survey of 1,000 children in Leicester found that 94% of children wanted to spend more time out of the house. Another survey in Northamptonshire found 80% of 9-16 year olds saying they preferred being out and about rather than staying in. (Worpole, undated, p.6).

Engaging young people in projects that improve their surroundings can generate a renewed sense of community spirit, provide learning and employment opportunities and contribute to the creation of more cohesive and safer neighbourhoods. Working with young people on regeneration projects in their neighbourhoods can be empowering and deliver real benefits for young people themselves and for disadvantaged communities in general. Furthermore, being able to participate in their own surroundings and their own futures is crucial if today's young people are to grow into tomorrow's responsible decision-makers.

Our aspiration then must be to enable this to happen. Planning for play and creating safe street networks and spaces for children and young people are preconditions of a healthy community life. Our goal should be to integrate streets, parks, open spaces, paths and town centres into one continuous, safe and accessible public domain to create 'young people friendly neighbourhoods'.

Barriers

In the UK at least, the prevailing public perception of young people, particularly teenagers, is problematic and often a little schizophrenic. When in small numbers, or indoors, under control or supervision or engaged in a planned or well understood activity, then that's OK – we like young people like that! But when outdoors, doing their own thing, perhaps in larger groups, maybe being a little loud or boisterous, then we get nervous, worried and often fearful. The presentation of policy, with young people as the cause of dysfunctional neighbourhoods, overlooks the fact that in the vast majority of instances, young people are more likely to be the victims. Anti-social behaviour must of course be tackled, but it is unfortunate that policy and media debate focus on dealing with effects, e.g. the serving of Anti Social Behaviour Orders (ASBOs), rather than adequately examining and addressing underlying causes.

Creating young people friendly neighbourhoods through the processes of regeneration, renewal or development may mean challenging a number of what are now established norms and expectations; overcoming this status quo is therefore itself an barrier. For example, if there is a need to provide somewhere for children to play, a colourful, new, formal play area with nicely arranged pieces of play equipment is now usually assumed. Manufacturers of the necessary components, such as safety surfaces, dog proof fencing and play equipment, all produced to appropriate European safety standards, will promote their offerings via glossy catalogues. It can be quite difficult to take a different route and pursue more strategic, imaginative and consultative solutions. The Children's Play Council has made a key contribution to the issue of appropriate play provision within the UK. Their publication, 'More than Swings and Roundabouts' has provided a valuable guide to good practice and is now helping to influ-

ence both pubic sector funding and local delivery. Children's Play Council (2002).

Questions of how best to measure success can also present a barrier. Groundwork believes that enabling young people to actively participate in making their neighbourhoods cleaner, safer and greener can help foster pro-social behaviours and there is much evidence to support this. However, there is no commonly agreed metric for these positive changes. This presents a problem for policy makers because success is often most easily measured as the avoidance of a negative, i.e. if a park is not vandalised, if graffiti does not appear or if levels of youth offending fall. The associated language again reinforces negative perceptions of young people.

A further barrier is presented by the fact that for a great many regeneration practitioners, it is still not widely understood just how much the quality of the participation process counts, in terms of involving children and young people in achieving improved outcomes for them and their communities. Poor participation techniques are the best way of ensuring young people stay disengaged and half-hearted attempts to involve young people can do more damage than good. A planned approach, over a realistic timetable, supported by professionals that have expertise in participation is needed – but is frequently missing.

Finally, there is the issue of meeting process costs. While there may be funding available for physical interventions, securing the financial resources for consultation and engagement can be more problematic. Much of the funding that has been accessed over recent years to deliver projects that connect young people with their neighbourhoods – such as the UK's Single Regeneration Budget (SRB) and European Structural Funds (ESF) - has disappeared or is in decline. As different routes to funding are developed, this could provide an opportunity, provided those responsible for planning and budgeting make adequate provision for meaningful engagement with young people. There are some reasons to be optimistic that there are movements in the right direction. For example, the UK National Lottery is making funding available to each local authority to enhance provision for play and in order to secure this the local authority has to produce a play strategy. At least some local authorities are taking the opportunity to engage with young people in developing these. In fact prerequisite of several UK National Lottery funding streams is now that young people must have been involved in developing proposals for change.

Solutions

While there is no single solution to creating young people friendly neighbourhoods, it is possible to identify a number of essential ingredients:

- Develop integrated public space strategies as a fundamental part of all regeneration strategies. These public space strategies should identify how the needs of young people – of all ages and all levels of physical and mental ability – will be catered for, providing safe, accessible play and recreational opportunities. Strategies should show how these provisions are to be incorporated, funded, managed and maintained.

- Address spatial marginalisation to ensure that play requirements are integrated into the public domain as a whole. This can help turn city centres back into family places and places where families might want to live. The concept of home zones, which originated in the Netherlands, have been used to a more limited extent in the UK as part of an attempt to recreate spatial continuities. "In Amsterdam the most prestigious site in the city, the Museum Park next to the Rijksmuseum, is given over to children's play and skateboarding provision; the same is true in Rot-

terdam where the two big new city centre sites – Schouwburgplein and Westblaak – have been designed as meeting places and playing places for children and young people." Worpole, (undated).

- Actively involve and seek the views of young people, parents and carers, and professionals involved in children's well-being. The importance and benefits of encouraging young people to participate in shaping their own surroundings and their own futures cannot be over-estimated. Young people need support to enable them to contribute fully: too much responsibility too soon is setting them up to fail. Also, if young people are drawn in too early, or at a superficial level, then there is a risk that they will be further marginalised and disillusioned. It is essential that service providers and government adhere to the United Nations Convention on the Rights of the Child, to which the UK is a signatory; in short, ensuring that equity is achieved.

- Ensure design quality and promote 'natural' outdoor play. Generally there is a failure to provide play environments that offer opportunities for exploration, excitement, self discovery and group autonomy. The modern forms of risk-free play areas may displace problems and deflect children to more dangerous places; children may also start to explore risk in more anti-social and personally dangerous ways. Play environments that are more natural – with site specific landscaping and design which responds to local identities, topographies and social patterns - need to be developed. The City of Freiburg, Germany has championed this approach to creating natural playgrounds, drawing extensively on research into the positive benefits of natural play. Experience has shown that these are cheaper to build than conventional play areas and about the same cost to maintain – most importantly, children love them! The refurbishment of a number of traditionally barren, black asphalt playgrounds in the UK into more challenging play environments, some of which also include gardens and wildlife areas, is a welcome move which should be more widely encouraged.

- Incorporate the necessary cost and maintenance regimes, to keep these areas in a good condition, into designs and budgets from the outset. "If children are to be able to play freely and free of charge in their own neighbourhoods there must be public provision for this and significant, secure funding has to come from the public purse." Cole-Hamilton (2006). Similarly, it is important to ensure that a sense of ownership is engendered within the local community and with the children and young people themselves. Playgrounds also require visible, daily supervision – preferably by local people who feel a sense of ownership for the site.

Positive examples

George's Park, Birmingham

In 2003, George's Park in the Lozell's area of Birmingham was a dilapidated and unsafe playground. After the local Bangladeshi Forum raised their concerns, Groundwork, working in partnership with the junior Friends of George's Park, as well as the city council, the Police and local youth agencies, began a full scale redevelopment.

The young people worked closely with Groundwork throughout the process and their aspirations for the space shaped the physical development of the park.

Now, George's Park is vastly improved and contains a redesigned children's

playground, youth shelter, skate park and multi games court encompassing basketball and football. Young people continue to he involved in the park and have designed two ornamental gateways as entrances and are working with Groundwork on a series of art features.

The sports areas are reported as being very well used, all the time until the park closes at 11.00pm. A local resident said about the park "Now it's somewhere that's really good to be in. And you'll see people using it all day – going to school, shortcuts to work and all." Williamson Joyce Research Ltd (2006).

Community Regeneration – Lismore Park, Slough

Slough's Lismore Park co-ordination project is funded by Nai Roshni Partnership as part of the borough's regeneration scheme.

The aim of the project is to engage and consult the local community to develop ideas to improve the facilities for young people and the wider community. Groundwork has been working in partnership with a wide range of local agencies and the residents of Lismore Park to develop and increase the sense of community pride and spirit. The work will benefit all members of the community, however there is a particular emphasis on the parents and young people of the estate.

A range of activities are already underway, and consultation with local people has informed an outline plan for improvements to their open space. Current activities include: more activities after-school and during school holiday periods; sports activities; dance and book clubs; a video newsletter along with the establishment of a residents' newsletter group. £40,000 has been raised towards park improvements.

Future work includes plans to fundraise a further £160,000, facilitating resident focus groups to develop ideas and take decisions for improvements to the park, and developing further opportunities for the whole community to participate in a wide range of events.

Birchwood Community and Memorial Park, Lincolnshire

This initiative is creating a new public park in a housing estate on the outskirts of the City of Lincoln. With funding raised through the UK National Lottery, the active engagement of young people, from 5 to 21 years old, in helping to determine priorities and designs, has been fundamental to the approach. Of particular interest is the intergenerational dimension of the community engagement. The whole area has an interesting history having been the site of a major World War II air base, RAF Skellingthorpe. Aside from remnants of original runways, there is little in the way of physical reminders, but many of the elderly residents were involved with the base and a number served within the squadrons.

By bringing together older and younger generations with a focus on improving the area, not only is a park being created that will meet the needs of young people, but community cohesion has been strengthened as a result of the mutual respect and understanding developed thought joint working.

Groundwork YPFN Programme

A number of Groundwork Trusts across the UK are participating in a programme called 'Young People Friendly Neighbourhoods'. The programme is supported by the National Lottery's Young People's Fund and is focusing on 17 neighbourhoods suffering high levels of deprivation. The programme is putting significant resource into the whole process of engaging with young people, developing their confidence, enabling them to voice their concerns and ideas, thus influencing the future provision of services and facilities. It is working to ensure that children and young people are at the heart of community participation. This means not just

consulting them on the issues but ensuring that they are also involved at every stage of the process i.e. from consultation, through the planning and design stages, to actually making the some of the physical changes. In the spirit of engaging young people, a youth workshop was organised at the outset to formulate the original grant application.

Groundwork's approach to working with whole communities means that as well as providing specific targeted work with the young people through YPFN, environmental changes are developed within and for the whole community. This raises the profile of young people's issues generally and ensures that young people are a central part of highlighting the problems as well as identifying and creating the solutions.

Although still in its early stages, the programme is already yielding some interesting findings. In some of areas it is proving to be a real challenge to engage with young people who have been seriously disillusioned by other, more superficial efforts to encourage their involvement.

In several areas where young people had not previously been asked for their opinions, the issues that they raised were identical to those raised by the adults e.g. safety, lack of street lighting etc. This has surprised the adults who had assumed that young people were causing problems within the neighbourhood and is giving them a common cause to pursue with the relevant authorities. This work is breaking down barriers between adults and young people, reducing tension and creating opportunities for adults and young people to work together. For example, some young people have now become members of a Residents Association.

The YPFN programme has gathered a great deal of evidence of very poor or non-existent facilities for young people. This includes the absence of green space and provision for play, youth clubs being knocked down to make way for new housing and limited access to community and sports facilities.

From early evaluation there is emerging evidence of the following programme outcomes:

- Increased confidence and self esteem amongst young people
- Young people learning new skills
- Young people having fun, having something to do and somewhere to go
- Trust developing between young people and Groundwork youth workers
- Increased profile of young people's issues in some local neighbourhoods
- Increased use of local facilities in some areas
- Young people engaging in local decision making processes and organisational structures in some areas
- Individual projects engaging with partner organisations and being involved in multi-agency strategies i.e. involvement in Local Strategic Partnerships, play strategies and neighbourhood/community action groups.

Conclusions

Human evolution is a very slow process – biologically today's children and adolescents are no different to those of 50 or 100 years ago, with the same basic developmental needs. However, the nature of childhood has changed dramatically; growing up today is a very different experience to that of previous generations and many important experiential opportunities that were commonly available in the past are today largely denied. We can look back to the relatively recent past and identify what has been lost, but there is

little point in trying to re-create bucolic notions of a golden age, uncorrupted by traffic, high-rise and mass media. We must work with current realities and move forward. But we have two choices. We can either simply work to help young people adapt to the changes taking place around them. Alternatively and preferably, we can actively seek to engage with young people to influence these changes, so that our towns and cities can provide the wonderful and nurturing places in which to grow up that they deserve.

In the UK, signals of progress are mixed. Lots of really positive things have happened in recent years. Every Child Matters, the government's 2003 policy framework for supporting young people, significantly raised the bar and the policy outcomes that every child should 1) be healthy; 2) be safe; 3) enjoy and achieve; 4) make a positive contribution; and 5) achieve economic well-being, have assumed real currency within delivery organisations. HM Government (2004). The government's 2006 Sustainable Schools Strategy is also very positive progress, promoting a much stronger connect between development and activity within schools, and that within the wider physical and social environment. There are many excellent examples of good practice where supportive local authorities, committed professionals and young people with energy and imagination are together effecting real and worthwhile change. It's clear however that we've much still to do. The fact that a 2007 UNICEF report put the UK bottom in a league of industrial nations for child well-being emphasises that we're still a long way from creating the young people friendly neighbourhoods we really need for the future. UNICEF (2007).

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3.7 Effective Community Involvement Tools

Sabine Martin

ABSTRACT

Community involvement is an extremely important aspect of revitalization for any community, no matter what size. Without community buy-in, a project may never get off the ground or will not be accepted once it is completed. In the U.S., federal brownfield grant monies are tied to community involvement, i.e. without implementing and documenting the latter, no monies will be awarded. The Center for Hazardous Substance Research (CHSR) at Kansas State University, U.S., provides technical outreach services to communities and successfully employs various community involvement tools and techniques such as workshops and training sessions, community visioning, fact sheets, and community meetings. These tools/techniques contribute to a successful revitalization project in that they foster communication between stakeholders and informational exchange. Only an informed community will participate in and make meaningful contributions to a revitalization project leading to sustainable redevelopment.

Why Community Involvement?

Community involvement is an extremely important aspect of revitalization for any community, no matter what size. Without community buy-in, a project may never get off the ground or will not be accepted once it is completed. In the U.S., federal brownfield grant monies are tied to community involvement, i.e. without implementing and documenting the latter, no monies will be awarded. Often this requirement is a stumbling block for entities/communities seeking federal grant monies. Either community involvement is regarded as a minor nuisance and is dealt with too late and ineffectively, or there is a general lack of knowledge as to how to engage a community. Either way, the result can be disastrous: delays in construction resulting in loss of money, law suits, a disgruntled citizenry going public resulting in negative media coverage, non-acceptance of a revitalization project, again resulting in loss of money and, worse case scenario, a non-sustainable project reverting back to a brownfields site – the very thing that was supposed to be remedied.

Successful community involvement is based upon information and dialogue. Only an informed community can be part of the decision- making process, which then will lead to a sustainable revitalization project.

Selected Community Involvement Tools/Techniques

The CHSR TAB program provides a variety of services to communities, some of which are specifically designed to improve understanding of all aspects of revitalization, to take input from the public, and to build community consensus. Depending upon the specific needs of a community, TAB

provides brownfields workshops, summaries and reviews of technical reports, serves as a liaison between communities and other stakeholders, assists in identifying funding for brownfields revitalization projects, facilitates community meetings, provides visioning workshops, writes and distributes fact sheets on environmental and brownfields topics, reviews grant applications, assists with writing brownfields program RFPs (Request for Proposals), and provides guidance throughout the entire brownfields process. An important feature of this assistance is that it is free and non-biased, as TAB assistance is not funded by the community and CHSR is not a stakeholder.

The following describes a selection of community involvement tools and techniques successfully employed by the CHSR TAB program.

Workshops/Training Sessions

Conducting workshops with appropriate content tailored to the information needs of a community is a very effective way to get the community involved and at the same time disseminate critical information. Workshop content can cover a wide variety of topics, ranging from very basic introductory information to, for example, groundwater fate and transport issues. Participants will retain more information if they are engaged and awake. Especially when covering technical information, it is important to make the session as entertaining as possible and to use examples the audience can relate to.

Very few, if any, community members will likely have a technical background that allows them to grasp remedial concepts and/or contaminant transport without explanation. Technical information can be difficult to digest; hence, it needs to be presented in layman's terms so that concepts are understandable and workshop participants can contribute to the decision-making process for site remediation/revitalization. Inclusion of hands-on segments, for example exploration of groundwater/surface water interactions using a model or planning a brownfields revitalization project, are very helpful in keeping the audience engaged.

In order to facilitate communication among workshop participants and between presenters and workshop participants, it is best to hold a workshop in a relaxed setting so that participants are not afraid to speak up and ask questions or provide comments. Time for networking and discussion should be included throughout the workshop agenda. It is also helpful to have a variety of presenters, because a one-person show has the potential to become boring.

As CHSR is frequently conducting workshops and training sessions, pre- and post-workshop surveys are used to evaluate the effectiveness of the workshops on the participants' knowledge acquisition and changes in attitude and/or perception related to brownfields redevelopment issues. Typically, follow-up for workshops continues for six months to a year, with additional data collection to determine long-term results of the training. Our accumulated data indicate that workshops and training sessions are highly effective tools in disseminating information and fo-

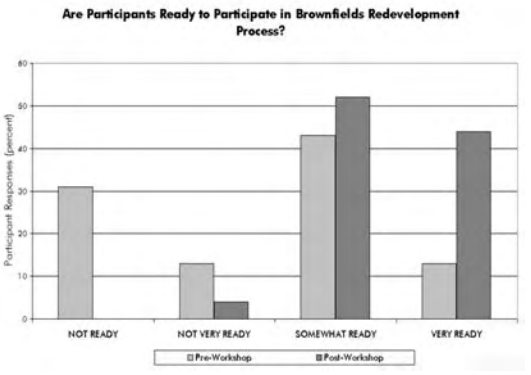

Figure 1: Readiness to participate in brownfields redevelopment prior to and after attending a workshop (Griswold, W., Martin S., 2006)

stering community involvement. Depicted below is an example of how readiness to participate in the brownfields redevelopment process changed based upon workshop attendance.

Visioning Sessions

Community visioning is a highly effective tool to involve the community and provide for a sense of ownership in a project. It is a strategic planning process that values input from all stakeholders. The goal is to explore and evaluate community development and revitalization options through community meetings, design charettes, small group discussions, and workshops. This is a very inclusive approach facilitating communication and discussion among all stakeholders. Every opinion counts and is evaluated; youth and even children can participate; no prior technical knowledge is required and the entire process is very relaxed. Visualization of development and revitalization ideas can be a catalyst as far as community involvement in a revitalization project is concerned. It has the potential to unite the community and produce full community support for a project.

As CHSR is housed at a university, the opportunity to involve students in visioning sessions and design charettes presents itself, if the curriculum is compatible. Whenever possible, CHSR works with landscape architecture students, who incorporate a charette or visioning session in a class project. This approach presents a win-win situation, both for the community as well as the students. The community will have good visual images of its proposed redevelopment plans, which can be attached to requests for funding. As these images are developed through the community visioning process, they represent true community involvement, which is critical for successful grant applications. The students will receive university credit for their work and gain invaluable practical experience. As it is not always possible to work with students on design charettes and visioning workshops, other resources such as local artists and architectural firms (pro bono work) can help provide input and produce images of revitalization plans. Depicted below is the result of a community visioning session.

Fact Sheets

Pertinent information to the revitalization process can be distributed using fact sheets that explain various topics. This is not considered a stand-alone tool for community involvement; rather, it should be coupled with workshops and community meetings as communication is the key to successful community involvement. Fact sheets are a good way to provide basic information that can be taken home and explored further as time allows. Information presented needs to be clear, concise, and in layman's terms. Additional resources should be provided as references in case a person would like to explore the presented topic further. Contact information to answer potential questions should be included. Fact sheets will assist the

Figure 2: Current Site Status

Figure 3: Community Visioning Outcome

community in making informed decisions regarding revitalization issues.

Community Meetings

Attending and/or organizing community meetings and getting to know the community is an important step toward community involvement. Making the effort to understand issues and seeing a project through the eyes of affected stakeholders builds trust, promotes open communication, and facilitates potential conflict resolution. Recognizing and addressing problems early in the revitalization process prevents costly delays and aggravation later. Bringing a community together to talk about revitalization issues and to provide input can be very beneficial as it promotes a sense of ownership in the project.

Conclusion

Community involvement is an important aspect of any revitalization project. The earlier in the process it occurs, the more beneficial it is to everyone involved. In order to be effective, community involvement needs to happen frequently throughout the entire revitalization process. Workshops and training sessions, community meetings, visioning sessions, and the distribution of fact sheets all contribute to a successful revitalization project in that they foster an informational exchange among stakeholders. Only an informed community will participate in and make meaningful contributions to a revitalization project.

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3.8 Examination and analysis of economic and social effects of inner-city brownfield redevelopment

Frank Burchardi, Birgit Memminger, Susann Schuster, Kilian Bizer, Sven Heilmann, Georg Cichorowski

ABSTRACT

The crucial question for municipalities is how to handle inner-city brownfields in the most economic way. To find an answer, this project researches already revitalized brownfields and assesses their former and current situation in selected townships in Baden-Württemberg, Germany. Inspected were 21 brownfields in 15 townships all over Baden-Württemberg. For all brownfields the project estimates costs and benefits of revitalization. The working hypothesis of the project is that brownfield redevelopment is in most cases rewarding in general economic terms, even though specific actors, like townships, might not necessarily derive a budget surplus from them. The project is divided into four steps including, first, selecting already recycled areas, second, collecting data from townships as well as inhabitants, third, evaluating data and, fourth, transfer of results to townships. Currently, data collection is being finalized and first results from data evaluation can be obtained. Final results are expected by the end of July 2007.

Introduction

The problem of brownfields is well known to most townships of Baden-Württemberg. For ecological, economical, demographic as well as architectural reasons, townships have to find a sustainable answer to this problem instead of spreading out more and more into the countryside. While urban sprawl appears the short-termed answer for many townships, in the long run revitalization is the more reasonable answer. In order to achieve this, it is widely accepted that additional incentives should be implemented (Bizer 2005, Bizer et al. 2006).

On the other hand, townships frequently do not know the benefits and costs of revitalization. In the United States of America it is estimated that funded investments for the recycling of brownfields will end up in with a return of 10 dollars for every invested dollar for the township budget (Pöttler & Haberl, 2001). Realizing that such estimates are always problematic, the project aims to gather quantitative and qualitative data, how German townships profit from revitalization.

To do so already revitalized projects in the federal land of Baden-Württemberg have been analyzed to figure out the future advantages and disadvantages for townships and their budget.

The economic and social data are put into a cost-benefit-framework in order to demonstrate positive as well as negative changes for the concerned township. Ideally, the project will allow the project team to draw conclusions on the favorable and unfavorable conditions of revitalizations.

Realization

The project is divided into four steps. In the first step we selected already recycled brownfields in townships willing to cooperate in this project. In the second step we collected data by conducting questionnaires with township administrators as well as inhabitants of the respective area and bordering neighborhoods. The third step consists of data evaluation and step 4 will be the transferring of the result to the townships.

The team working on this project since March 2006 consists of the special research group on institutional anaylsis (sofia) at the University of Applied Sciences, Darmstadt, the Chair of Economic Policy and SME Research, Georg-August-University Göttingen, and ES EnviroSustain GmbH, Kirchheim unter Teck.

The scope of duties is divided between the three members. The research group sofia developed the economic questionnaires and is evaluating them at this point. The Georg-August-University Göttingen designed the social questionnaires and is conducting the analysis of the data right now. ES EnviroSustain GmbH coordinates the project, inspected the locations, collected the data and is responsible for the data transfer to townships and the realization of the project.

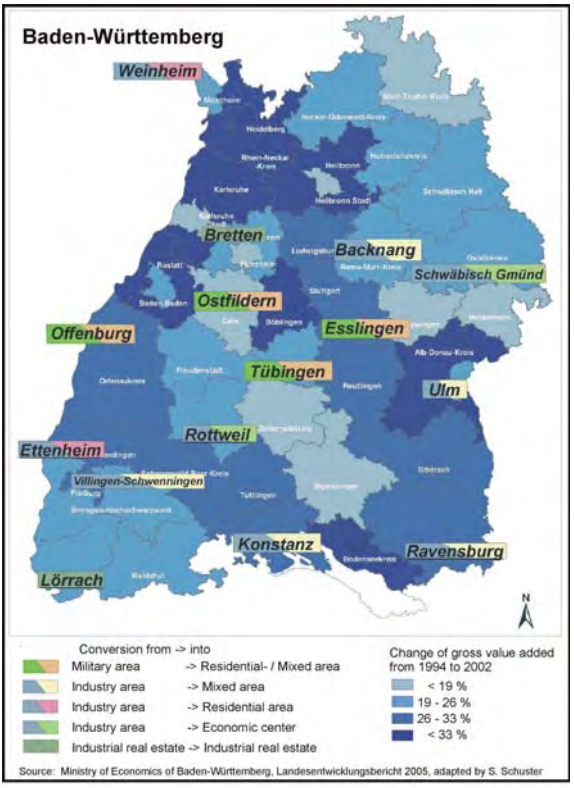

Figure 2: Location of the investigated townships

Step No. 1

In this project 21 brownfields in 15 townships all over Baden-Württemberg were inspected. The townships vary in size, economic regions and connection to the road network and were selected to present a certain variation of characteristics.

Also, the derelicted locations vary in size, former and current use, situation of contaminations and project realization and management.

To collect data two different ways of approaching, one reductive and one inductive, were used, which are statistically analyzed.

Examples for the reductive one are: cost of the brownfield revitalization, to maintain jobs and create new

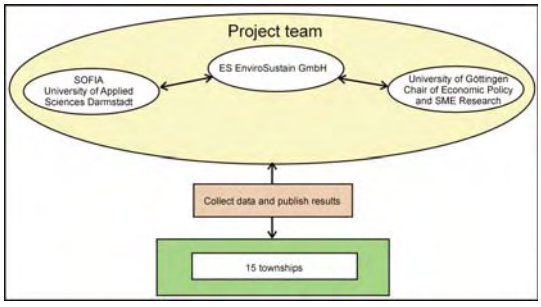

Figure 1: Project organization

jobs, fiscal reflection, volume of investments, to settle new companies, increase the worth of the area, area indicators.

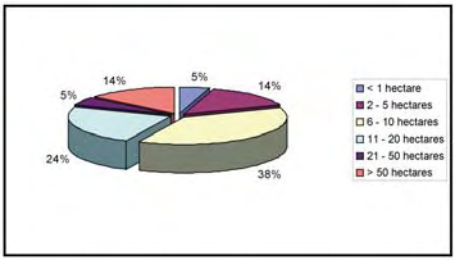

Figure 3: Size of the derelicted areas

Examples for the inductive one are: quality of daily life and work, increase of the inner-city attractiveness, cultural and social facilities.

Step No. 2

With the economic questionnaire in step no. 2 information about the project character, the general conditions, the expenses and the possible financial plus for the township's budget are collected. Representatives of the townships were interviewed with this economic questionnaire. Sometimes the investors were interviewed, too, depending on the use of a project developer.

Residents on and next to the revitalized area were interviewed with the social questionnaire about the change and the current quality of life.

Table 1: Topics of the economic and social questionnaires

Economic questionnaire	Social questionnaire
• Planning • Site development • Preparation of land for building • Construction • Income tax • Real property tax • License tax • Appropriating of money • Share in the costs	• Living • Services • Cultural activities • Spare time activities • Road network, public transfer

The analyzed data of the questionnaires will be analyzed in a cost-benefit-framework.

Procedure

We started by researching locations, their former and current use. Then tours to the project areas were made and residents interviewed with the social questionnaire. The residents were extremely open to the questions and actually enjoyed to share information and first-hand experiences.

The extensive preparation appeared to be most advantageous in the interview with the township representatives. It made it possible and easier to collect the important information in less time. Also the representatives answered the questionnaires quickly and gave information very willingly. Just the questions about subsequent costs and taxes were more demanding. In general the townships were pleased to have someone who is interested in their revitalized brownfields, projects costs and their effects. Practically all of them are looking forward to receive results on costs and benefits of their revitalization measures.

Situation

The current situation of the project is that the first two steps are finished and all information is already collected in a data base. Currently, the analysis of the data is focused upon. The research partners are analyzing the data from the social and economic questionnaires and gather extra information at this moment. Results are expected by the end of July 2007.

Future Perspective

The results will be handed over to the townships to allow for a broader analysis of their revitalization measures. In addition, the results will be published in order to improve decisions of other townships with regard to brownfield revitalization. We believe that sound economic consideration will lead in many more cases

to brownfield revitalization and thereby increase life quality in townships. Even with current incentives at work, in many cases revitalization already pays off for township budgets in the medium and long run.

The project team would like to thank the federal land of Baden-Württemberg Environmental Ministry's program "living basis environment and its protection" for funding support.

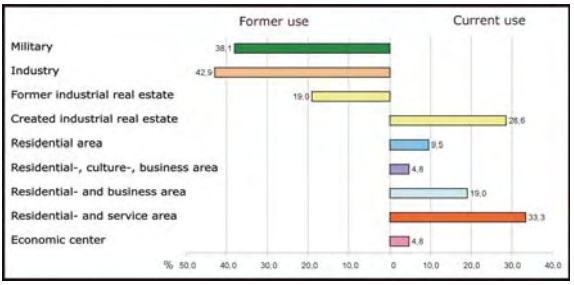

Figure 4: Change of use

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3.9 Public participation in the remediation of the warfare related site Stadtallendorf – conception, principles, experience

Christian Weingran

Abstract

Participation of citizens and information are important factors of success for warfare remediation projects, especially on inhabited sites, if they are carried out consequently, seriously and professionally from the very beginning.

Participation of citizens can be successfully, if the decision processes are seriously carried out in an open-minded way. In the practical remediation the concerned residents got far-reaching opportunities to participate in the project with the conclusion of remediation agreements under public law and with the cooperation in the case of estate related detail regulations.

Consequential citizen participation and public relation reduces friction losses in a remediation project and minimises resistance and facilitates acceptance. Thus it is easier to plan a project, the duration of the project can be shortened and the project costs can be reduced.

The time involved for citizen participation and public relations should not be underestimated, the costs are, however, less, compared to the costs of downtime at the construction site and even more expensive lawsuits.

The warfare related site Stadtallendorf

In the course of the national socialist arms industry programme the Oberkommando der Wehrmacht (High Command of the Army) in 1938 designated a part of the Herrenwald in the south of the small village Allendorf in the district Marburg-Biedenkopf as the site of two explosive plants:

The plant Allendorf, planned and built by the Dynamit AG (DAG) had been operated by a subsidiary of the DAG, the company Verwertchemie. The plant was built and owned by Montan Industrie GmbH, a company owned by the German Reich.

The plant Herrenwald was planned and built by the Westfälisch - Anhaltische Sprengstoff AG (WASAG) at the expense of the German Navy, from which it had rented finished plants for the production.

After 1938 the largest TNT production site of the German arms industry came into being. In the DAG about 130,000 tons of raw trinitrotoluene (TNT) had been produced until the closing down of the factory on March 27th 1945. In the plant Herrenwald about 100,000 tons explosives had been filled.

Both plant sites include about 400 ha. In the DAG a total number of 430 massive buildings, the roofs of which had been planted for camouflage reasons, were erected for the production. Furthermore the plant had some 60 km of wastewater systems and a 24 km sewer to the river Lahn for up to 6,000 m3 highly toxic wastewater/day.

Parts of the plants were dismantled and about 30% of the buildings had been blown up.

With the release of the DAG site a quick

settlement and conversion of the former production sites took place, first of all by business enterprises and later on by private settlements. The DAG site shows at present a significant diversity of private and industrial settlements. In addition forested sites can be found.

Today more than 4,000 of the 21,000 inhabitants of Stadtallendorf live on estates which had served explosive production in the past, more than 8,000 people work in plants which were erected on those areas. The town became a centre of industrial importance for the region.

The current road and path network comes to a large extent up to the 25 km of the former roads and path. About 50 % of the past wastewater system, which was about 70 km, are used for the public sewage system. The existing infrastructure of the waterworks of the DAG had been integrated into the regional drinking water supply. Annually about 11 m. cubic meters of water are provided by the regional waterworks.

Due to the production and processing of ammunition as well as by dismantling in the post war era hazardous substances were introduced into soil and groundwater. Relocation of the hazardous substances was a consequence of extensive civil construction activities which were carried out to enable the use of the site for civil purposes. Possible health risks which could arise from residues of the explosives production were not discussed for a long time.

The result of the investigations which had been carried out since 1988 showed that the contamination with hazardous substances in some areas of the DAG site was so severe that a risk of human health could not be excluded. The assessed ground water contamination with explosives showed that there was a hazard to the ground water.

Explosive compounds comprise a number of aromatic nitro substances, first of all trinitrotoluene (TNT), but also preliminary products [dinitrotoluene (DNT) and mononitrotoluene (MNT) as well as degradation products (e.g. amino-nitrotoluoene)]. The compounds possess varying toxicity, mutagenicity or carcinogenicity; some of them release gaseous emissions. The found residues were still explosive.

On January 1st 1993 the project was commissioned to HIM-ASG.

Until 2005 the investigated contaminations of the soil and sewers had been eliminated or protected to a large extent, the consequential hazards were removed: 125 t hazardous substances, which posed a threat to the people when eating plants or getting into contact with the soil, more than 3,000 kg of explosive TNT in sewers were eliminated and destroyed. Due to the use-specific remediation strategy the use of the funds was optimized and the intervention minimized.

The resource ground water could be effectively protected and is furthermore provided in the region as high-quality drinking water. The development of new recovery plants is no longer discussed – the waterworks had been extended at the site. Since 10 years hydraulic measures have been carried out without failures and excess of the permissible values, they have been adapted to drinking water recovery.

The main contamination TRI dump had been eliminated.

More than 70 km sewers had been investigated, the location which was sometimes unknown as well as the unknown condition had been recorded, and the sewers had been cleaned of contaminants and if necessary closed down.

The remediated sites are no longer considered as a health risk and no environmental hazards in connection with the present or planned use of the site are to be expected. Thus the most important project objectives were achieved.

Figure 1: Conversion of former production site

The large funds for the remediation provided by the state Hesse, however, contributed to the maintenance of the industrial site and a large number of jobs. Since progress of the remediation became obvious increasing private building activities and enlargement of plants show the regained trust into the site.

Since a long time there are no more considerations to give up the site, and the fear that a remediation cannot be carried out at this site could be impressively disproved. The opposite is true: The work in Stadtallendorf contributed essentially to the consideration that currently there are no insoluble technical challenges at the remediation of inhabited warfare related sites - neither during the investigation nor the evaluation or remediation. All instruments are tested and available. The remediation is feasible!

There are still parts of those buildings where ammunition had been produced. In spite of extensions and modifications they do remind at the historical contamination, at the history of buildings, streets and sewers, at the purpose and the conditions under which the production took place. They also recall the necessity to come to terms with this reality, which means a great deal of effort especially in connection with the German history.

Why public participation?

The fact that people are living on the warfare related sites adds another dominating problem area to the already complex problem of the remediation of warfare related sites. A technical-economical-ecological question receives a social component. The announcement and execution of warfare related remediation means for the concerned a massive intervention which means that they are subject to psychic and physical influences but also to economical and legal influences.

Insecurities and risks have to be considered, often with respect to health risk (especially with children). People have to consider toxicological expertises; they must understand the importance for their own situation and cope with the acquired knowledge. In addition sorrows and fears about damages and loss of property, restrictions to use the site, questions of eligibility for a loan or the influences on the land value are of importance. In addition insecurities and sorrows can arise from this unknown topic and an insufficient transparency of administrative transactions.

The reaction of the concerned can be characterized by mistrust, in some cases even by refusal and rejection, by aggressive quarrels and preposterous demands.

Sorrows and fears of the concerned have to be taken into consideration, they have to be taken seriously. The participation of the concerned and an active information and public relation are an important requirement for a successful remediation of inhabited sites.

In this connection success requires trust and the necessity to communicate a positive vision of the future. It means to show and develop advantages which can be part of the remediation, e.g. by combining it with a recycling of the site, enhancement of the structure and improvement of the infrastructure.

In view of the previous negative experience at other sites, the land Hesse decided very early to adopt an open information policy and to give the concerned inhabitants of the site the possibility to participate in the

preparation of the decisions.

The objective of the remediation is a legally founded, economically and technologically efficient and socially acceptable implementation of a use specific remediation. Administrative actions are to be replaced by consensus and cooperation. This should lead to a prevention of cost-effective delays in the remediation process as well as lawsuits. The smooth execution on schedule was also intended to effect an additional positive evaluation of the measures by the public.

Initial concepts had been developed by Kassel University. They recommended giving a major significance to the participation of the inhabitants concerned by the remediation. For the implementation of this objective a „council" should be initiated, a "citizens' participation office" should be installed and a "co-ordinating work group of the competent authorities" should be formed; with the aim to integrate also the authorities at a round table for a smooth execution of these complex measures. All three bodies were implemented.

Estate owners and users who suffer from an interference in their estates are entitled to information about hazards, risks and consequences and about plans and they are entitled to participate and be integrated into the decision process. It is important that all interests are considered.

Establishing trust between the concerned and the decision makers of the remediation agency and the competent authorities was regarded as an important task.

Objectives and principals

The protection of the rights of the concerned as well as creating a climate which benefits the work and a social cooperation is an important motivation for the interaction with the concerned and the general public.

Information

If the concerned, the multipliers and the general public have a high level of information about relevant questions with respect to the remediation, a qualified and appropriate discussion about concrete questions will be possible. Information is the presupposition for acceptance. In addition this means knowledge is power and a balanced level of information can help to reduce an imbalance of power. This can also help to reduce avoidable potentials for conflicts.

Participation

The most important objective of participation is to search for commonly accepted solutions. Citizen participation is aimed at consensus.

First people's acceptance for measurements is improved, if they realize their chances to participate. This favours to carry out the remediation without interruptions and is helpful if there are any problems and adversities. The more engaged you get in remediation, the more included you are – and the more you are taken up with the remediation. And the more you are taken up with the remediation, by being responsible and formative, the less you will put up resistance.

Secondly the quality of the result may increase in concrete questions, if expertise and everyday knowledge of citizens are considered. As there often existed no appropriate routines available for the remediation of inhabited sites, this can mean a useable know-how resource.

Thirdly the participation with the opportunity of frequent direct communications may facilitate mutual trust. Thus measures can be carried out in a smooth and informal way.

Finally participation establishes understanding for difficulties which are due to remediation within the project management, in new insights/experience and individual problems. A general resistance of

the concerned can thus be reduced and oriented and specified to concrete detailed questions Whereas there are few constructive possibilities for a discussions on a general level (e.g. if someone is for or against the remediation), it is possible to find a solution, if detail questions are considered (e.g. the choice of a suitable place to set up a construction site).

Participation requires that structures are created and timetables are developed which enable the participation of the volunteering citizens (or their representatives). In this connection pressure of time is not helpful.

When implementing participation and information the following principles have to be considered:

A professional preparation und implementation has to be guaranteed for the participation and public information. In this context amount and date of the inclusion of external counsellors depend on previous knowledge and experience of the acting persons. In the conceptual phase when developing participation and information concepts external support and counselling can make sense. In the same way it can be helpful when moderating conflicts, if there is no previous experience or the concerned are the subject of the conflict and when a good presentation and style as well as methodological knowledge is important. Depending on the size of the project it should be possible to take over these tasks and thus prevent beginning dependencies. Public participation and information are no auxiliary services of engineering firms.

Table 1: Principles for the implementation of participation and information

Transparency	Understanding the action of the different people involved in the complex remediation process requires providing information. Well-defined decision structures and precise responsibilities/ competences (it has to be clarified, who is responsible) are also for the concerned of utmost importance.
Openness	Openness means to be ready to enter into a dialogue, it also means to provide information, discuss open-mindedly, to take sorrows and fears of the concerned serious, but also to speak about deficits and problems. Alternatives are to be provided and it has to be explained why proposals are rejected. The concerned have to get the opportunity to form their opinion, if necessary uninfluenced discussions with experts have to be made possible and financed. Openness also requires flexibility with respect to structures, dates etc.
Earliness/early involvement	To provide information and participation at an early stage is an essential requirement for trust, thus it is possible to approach concerned actively, to make offers, to act instead of reacting. It is also an advantage to start at an early phase, because there is usually less pressure.
Completeness	The concerned should have a very comprehensive and uncomplicated admission to documents which are relevant to the remediation and they should have access to all information which concerns their own estate. „Uncomfortable information" should not be hidden. To detect concealed information often means an irreparable loss in trust. A surplus of information should also be avoided.
Continuity	Instruments for participation and information should continuously be applied. It is also an advantage, if there is a continuity of contact persons.
Reliability	To keep promises and meet deadlines as well as the quality of information are important requirements for establishing trust.

Public participation

Project Council

The project council was a focal point of the public participation with respect to the whole site. Transparency and the offer to participate at the preparation of decision were important reasons for the council which had been founded on the initiative of the land.

In the project council concepts and plans were explained and discussed by the project management and the land. The council held irregularly public meetings and run its business with its own funds, it disposed, however, of means to use external expertise for the clarification of questions in its work.

The council consisted of initiatives and associations of concerned citizens, of representatives of political and administrative bodies (town and district level), representatives of the society (e.g. trade union (DGB), Friends of the Earth Germany (BUND)) and institutions which corre-

spond to the special character of the site (German army, immigrants). The involvement of important actors in local political decision structures was helpful. A member of the management board of a big company had the chair.

But with more than 20 members the council was a clumsy committee. Therefore opinion making took not always place in the plenum of the council, but often in individual or background discussions and meetings of the board of the council and in direct talks with the persons in charge of the competent ministry or the municipality. Plenary sessions took place more rarely, this had to be understood with respect to the fact that the concerned participated on a voluntary basis.

According to the articles it was "the task and objective of the project council to affect a wide-accepted compromise between technical issues, legal outline conditions and political decisions." This formulation shows the claim of the coordinating decision body. In practice, however, the council acted as the representation of interests of the concerned (inhabitants, companies, town). To clarify this role (whether decision, counselling or moderation), turned out to be important in order to avoid unrealisable expectation.

At the beginning of the remediation process the project council was of utmost importance for providing information and consultation as well as to discuss problems of fundamental meaning.

Figure 2: Remediation

During the remediation phase the majority of the comprehensive questions of the remediation had been answered and the tasks of the council changed to critical monitoring of the remediation practice and the moderation of conflicts.

Citizens´ Participation Office

The citizens' participation office (CPO) existed from 1994 till 2004 and was equipped with 2 part-time jobs. HIM-ASG and the town Stadtallendorf sponsored the COP, which was funded by about 90% by the state Hesse.

The CPO was the hub of the exchange between people concerned, HIM-ASG and other participants of the project. It established possibilities for consultations and discussions and participated in the information of the various target groups (estate owners, tenants, schools, foreign fellow citizens). It offered the possibility to the concerned citizens to consult an institution which was not directly responsible for project related decisions.

To guarantee a neutral representation of interests the CPO was independent in its statements. Its work contents and positions could differ from the positions of the town or HIM-ASG. The independent position of the CPO which was detached from the structures was not always without problems, it demanded responsibility in dealing with freedom and information and independent and qualified persons with excellent communication skills.

During the establishment of the CPO it was taken into account that the preparation and implementation of the citizens' participation has to be professionalized. This aspect was accompanied by the understanding that suitable equipment with resources (money and staff and competencies), clarification of roles, responsibilities and a development of adequate instruments has to take place.

The CPO combined interests and demands/claims of the concerned and supported them by speaking out and stand-

ing up for their interests. It supports the peoples concerned by consultations and information. A demanding task was the suitable management of information received from different sources. The CPO staff had access to all information (with exception of the contracts of the remediation companies); they participated in the planning of remediation measures in order to introduce the interests of the concerned into the planning.

In the remediation areas the CPO built up office containers. Office hours as well as (also short-term) agreed visits helped to intensify the contacts to the concerned citizens. The fact that it was possible to communicate with the CPO directly and to be able to reach them permanently was an important requirement for the successful work.

Remediation Agreement

The remediation is a public law contract between the owners, tenants and users of an estate who are concerned by the remediation and the state Hesse and regulates the rights and duties of the contractual sides.

In addition to this remediation agreement details about the course of the remediation on the estate in question are laid down in plot-specific regulations, as e.g.:

- Extent of remediation
- Planning of the garden
- Handling of material (e.g. fences, summerhouses, gates)
- Access routes
- Consultation of an expert for preservation of evidence
- Compensation (e.g. for cut trees)
- Replacement of living accommodation or hotel accommodation during the remediation
- Times of construction (e.g. "Saturday only after consultation of the concerned" etc.)
- In individual cases duration of remediation

The plot-specific regulations become legally binding part of the remediation agreement.

The conclusion of remediation agreements had proved itself. The remediation agreements made a contribution to the fact that in about 10 years of remediation on about 200 plots there had never been a lawsuit and that it was possible to do to a large extent without municipal directives. On the other hand the detailed regulations in addition to the extensive possibilities of participation were an important requirement that costly interruptions and shutdown of the remediation measures were avoided.

Information

The public information in the project was on the one hand aimed at the concerned inhabitants, on the hand related to the interested public at the site and sometimes to other interested parties. In the following the most important instruments are introduced. It should be emphasised that public information is first of all a tool to inform the public and to promote formation of opinion and thus it has to be differentiated from other PR activities (advertisement for products and services).

Leaflets

As basic information a leaflet had been published in two editions and distributed all over the remediation area. The leaflet provided basic information in a generally understandable language about the objectives, planning and structures in the remediation project. Current knowledge about responsibilities as well as a description of planned measures was provided. The leaflets aimed at information and motivation.

Media

Relations with the local and regional press as well as with radio and TV representatives were intensified, aiming at the following:

- Guaranteeing a continuous information of the media
- Establishing personal contact with the relevant media representative to build up trust in the provided information
- In the case of project related publications a research with the project management is always necessary.

Press reports were used for media information which provided news about current progress as well as obstacles and problems of the remediation and which referred to special events. Often there were discussions, local inspections and visits with press representatives.

This led to an intensification of media coverage. By and by it became more matter-of-factly and less of aimed at scandals. The articles concentrated more on progress in the project development than on covering problems and conflicts. Against this background even difficult situations (e.g. an interruption of operations during a remediation measure) were commented on with "I am pleased that the alarm plan works."

Citizen Info

is a simple and not very elaborate information tool for concerned inhabitants. In the case of events when concerned citizens are directly involved or events, which are directly perceived by the concerned an information for all concerned or for special groups are guaranteed by citizen info. It is mailed to selected addressees or partly laid open to the public. As a matter of principle in every citizen letter a contact of the project management is named. Citizen info were irregularly published about different remediation topics, e.g. about the risk assessment, implemented soil treatment technology and the remediation of the test area.

Citizen Letters

In addition to citizen information the citizens were informed by the project management about current aspects and the project progress with the help of citizen letters. Citizen letters are used for short information and deal with several topics in every number. They were first of all directed to opinion makers (like schools and clubs) and after the beginning of the remediation also to the concerned in the respective remediation areas.

Written information material can be read again and again, it is a guarantee that everyone receives the same information. The content of complex written information is on the other hand not always kept in mind; therefore this instrument is suitable to only a limited extent. Personal information transfer turned out to be more effective, it is, however, a question of time and effort, especially, if a large number of interested or concerned people have to be reached.

Video documentation

The video documentation had to provide basic information about the necessity of a remediation and the exemplary course of a remediation. The first one dealt with the remediation of estates in the first remediation area. The documentation had been supplemented several times by new aspects and documented in the final version essential phases of the remediation Stadtallendorf.

In addition to the documentation of the remediation course before the remediation started a video documentation of the remediation of the TRI dump had the task to visualise the planned measures and thus help the concerned inhabitants and the opinion makers to imagine them. Without any doubt this kind of presentation of the project increased the preparedness to allocate funds.

Project homepage

Since autumn 2001 concerned citizens and the interested public have the opportunity to inform extensively about the site and its history, the project and its background as well as about the project progress by visiting the URL

www.him-stadtallendorf.de

During the remediation current information about the project progress were submitted. About 650 users who are visiting the URL every month can download leaflets, posters and press reports.

Open day

Several times people concerned and the interested public was given the opportunity to visit the construction site. Before the remediation of the TRI dump (removal of a dump of about 100,000 tons of residues from wastewater treatment of the ammunition plants) was started neighbours and interested persons got the opportunity during an open day to "say good-bye to the dump" (the remediation of which had been discussed very vehemently in the public for a long time), and to get to know the established infrastructure. Former employees remembered the time when ammunition was still produced.

The involvement of the concerned in the remediation process

Experience has taught that with increasing information of the concerned and extended opportunities of formation and participation, the chances to accept the measures and the connected adversities and inconveniences also increase.

Parallel to the remedial planning the plot specific regulations were negotiated with the concerned owners, tenants or users. Here the concerned had the opportunity to influence the planning in detail. On the other hand the direct coordination with the concerned provided the opportunity to the planer to reflect on details of his planning and in some cases adapt parts of it to new aspects. The aim was not to be informed about made decisions, but the opportunity to influence them and to feed in knowledge/experience and ideas.

Concrete examples for the influence of the concerned residents were changing the transport roads, in order to avoid impacts on the residential areas, changing the geometry of the protecting tents.

The consideration of proposals made by third parties was a learning process for the concerned residents, who had to learn how to articulate their ideas and recognized that they were taken seriously. It was, however, also a learning process for the planers, the staff of the administrative bodies and the responsible persons of remediation, who went to the meetings without pre-defined ideas and who had to change their self-image that only they (the experts) know the best answer of a problem. Several times the residents have better solutions, because they are the expert for their estates. The project's challenge to develop solutions in cooperation with the residents, to speak a language and to prepare information that can be understood by laypersons should not be underestimated. This is also true, if the experts had to admit that sometimes there was no solution for a problem.

Among the positive experience of the project is that the participation did not result in unrealistic demands, got bogged down in details and obstacles but in better solutions.

During the first remediation measures it became clear that the instruments (information meeting and citizen information before the start of the remediation, accompanied by the CPO), which were planed in addition to the legally prescribed steps as part of the procedure to get a permission of the remediation plan (laying out to public inspection, objection, discussion) were not sufficient and repeatedly conflicts arose. On the basis of this experience HIM-ASG extended its offers, adapted them to the requirements and

Table 2: Instruments of information during remediation

Instrument	Participant, addressees	Content
Information sessions after presentation of the permission for the particular remediation area	All concerned in the remediation area Project management CPO Regional Council	Written information (map, schedule, phone umbers of contact in different administrative bodies) Presentation of planned course
Information meeting two weeks before the work in the respective construction site started	Concerned in the respective construction site Project management CPO On-site-manager	Facts about remediation of every remedial area. the planned course, duration of construction stages, details about particular work
Information meeting every four weeks in the construction area	Concerned in the respective construction site Project management CPO On-site-manager	Reviewing the last four weeks and prospects of the following four weeks Opportunity to utter criticism as well as to make suggestions
Monthly written information	All concerned, where the remediation was not entirely finished	Events of the past month, Reasons of schedule variance > 1 week, with influence on following steps Site plan of current work, information about finished work steps.

developed instruments for an information which accompanied the remediation. Table 2 gives a survey of these instruments.

A special form of information had been employed during the remediation of the TRI dump: In an information container a transmission of video pictures from the hall which was not accessible or not visible as well as current emission data and low pressure values were made available via monitors visible through a window at any time.

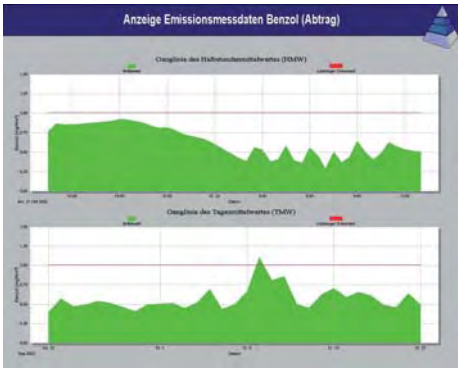

Figure 3: Online emission data

Conclusion

Participation of citizens and public relation are important factors of success for warfare remediation projects, especially on inhabited sites, if they are carried out consequently, seriously and professionally from the very beginning.

Participation of citizens can be successfully, if the decision processes are seriously carried out in an open-minded way. In the practical remediation the concerned residents got far-reaching opportunities to participate in the project with the conclusion of remediation agreements under public law and with the cooperation in the case of estate related detail regulations.

Consequential citizen participation and public relation reduces friction losses in a remediation project and minimises resistance and facilitates acceptance. Thus it is easier to plan a project, the duration of the project can be shortened and the project costs can be reduced.

The time involved for citizen participation and public relations should not be underestimated, the costs are, however, less, compared to the costs of downtime at the

construction site and even more expensive lawsuits.

The more than ten years of exercising citizen participation and public relation of the remediation project Stadtallendorf demonstrated convincingly that comprehensive active public relation, consideration of all interests and an emphasis on dialogue and consensus as determining principles are important for the success of a project. Numerous examples of positive feedback as well as the fact that there were no lawsuits indicate that the right strategy had been chosen.

It had been demonstrated that citizen participation and open information do not interfere with an effective remediation, but can contribute to better solutions.

3.10 Connecting with local people: a Liverpool perspective

Jenny Douglas

ABSTRACT

"Successful cities fully involve their citizens, and the future of Liverpool will depend upon this issue. Some people will want to become fully engaged in the regeneration process, others will want to step in and out. There are others who feel that the city centre is not for them. Liverpool Vision wants to provide everybody with an opportunity to participate in the regeneration programme for the city centre and to enjoy city centre life to the full." Strategic Regeneration Framework (2000).

Since its establishment in 1999, Urban Regeneration Company Liverpool Vision has undertaken a comprehensive and innovative community and education engagement programme to involve local people in the plans for the regeneration of Liverpool city centre. The paper will address the questions:

- **Whether the community engagement activity has made the programme for the city centre more effective and sustainable?**
- **What have been the particular challenges in engaging the community?**

Introduction

1. Government Policy and Community Engagement

Not all sections of a community can be pleased with the planning process all of the time, but the community as a whole must have faith in the process and believe that it is both positive and legitimate. Community involvement is integral in establishing a fair and transparent planning process, one that can be trusted and respected by all citizens.

This argument is supported by the November 2000 Urban White Paper 'Our Towns and Cities: The Future' in which the Government sets out its blueprint for an urban renaissance and recommends the establishment of 'urban regeneration companies' (URCs) in the UK. The paper emphasises that people must be given the opportunity to shape the future of their community with the support of representative local leaders.

The UK Government is driving forward a major programme intended to reform the English planning system. The programme, aimed at making the system more flexible and responsive, was set out in the Planning Green Paper and the related policy statement of December 2001 and July 2002.

'Community Involvement in Planning: The Government's Objectives' was published in 2004 by the Office of the Deputy Prime Minister (ODPM).

The paper was designed to highlight the importance of greater community involvement in planning, the Government's objectives for involvement in planning, and to show how such involvement fits into the Government's broader agenda. The report refers to 'Sustainable Communities:

building for the future' (ODPM: February 2003), which illustrates the Government's vision for sustainable communities, stressing that effective community involvement is the key to delivering the Sustainable Communities Plan.

The Government states that they are striving to deliver a system that:

- Provides opportunities for people to make their views known, irrespective of sex, age, ability, and ethnicity, and to have input into their community's development.
- Provides opportunities for business and the voluntary sector to equally engage with planning.

There is a strong case for community involvement in planning, but effective involvement can be challenging with a number of difficult barriers. The Government warns against never ending consultation exercises and stresses that "at some point the process must end" (ODPM, 1004, p5).

Why engage communities?

The Joseph Rowntree Foundation (JRF) summary paper – "Developing Effective Community Involvement Strategies (JRF, 1999) begins with the question: why involve the community? The answer is significant, "Quite simply because it produces better results" (p2).

The report continues, "JRF research shows that, to date, the impact of community involvement on regeneration has generally been modest, and that commitment to community involvement has often been tokenistic" (p2).

The paper identifies a number of key benefits associated with community involvement:

- bringing a fresh perspective and seeing problems in new ways;
- helping to more accurately target local needs;
- generating projects that are more acceptable to local people;
- fostering a greater sense of local ownership of projects and hence contributing to their longer term sustainability;
- building local skills and capacities;
- aligning local programmes with the government's stated commitment to partnership working;
- revitalising local democracy

These benefits have to be offset by a number of pre-conditions (which can result in a series of costs), for the development of effective strategies of community involvement:

- willingness to compromise among partners;
- willingness to share power;
- coping with diversity;
- adjustments to organizational culture;
- understanding different styles of work;
- constructive handling of conflict;
- adjustments to priorities and timetables.

The paper recognises that the two lists can be seen as a 'cost-benefit matrix' in which the costs of making the adjustments are subtracted from the benefits in the former list. In conclusion it is held that in many cases the costs are often seen to outweigh the benefits leading to what the ESRC Centre for Neighbourhood Research has termed as a practice of involvement which is "tokenistic, half-hearted and entered into somewhat grudgingly" (ESRC, 2003, p20).

The Fundamentals of Community Involvement

Though it is time consuming and challenging, in terms of resources and effort, the community must be able to take part in planning before the proposals are "set in stone". The community should believe that there is a point to their involvement and that their contributions are valued and acted upon. All members of the public and professionals should be aware of what is expected of them during community involvement and they should know what "to expect at each stage of the process" (Community Involvement in Planning: The Government's Objectives, 2004).

The Planning Policy Statement 1: "Creating Sustainable Communities – principles for community involvement in planning" (2004) sets out a number of operational principles that can be used to underpin community involvement.

The three, which are most relevant to community involvement within Liverpool Vision, are:

- The methods used to encourage involvement and participation should be relevant to their experience. There is no 'one size fits all' solution if a genuine dialogue is to be established and maintained.

- There must be clearly articulated opportunities for continuing involvement. The process should allow local communities to see how ideas have developed at the various stages, with effective feedback. There should be clear and formal stages when involvement should take place. These stages must occur as part of a continuous programme, not a series of disjointed, one off steps.

- There should be transparency and accessibility at all times and throughout the process. The process should be clear. People should know the ground rules and should know exactly when they will be able to participate. Involvement in the planning system should extend beyond those who are familiar with the system, to difficult to reach groups.

What does 'engage' really mean?

There is a real difference between 'consulting' or 'involving' communities and 'engaging' communities. The first two terms describe an approach that merely communicates courses of action, which have already been mapped out, and the latter describes approaches, which call for solutions through dialogue before key decisions have been made.

It is important to distinguish between the two and to make sure that the correct term is used at all times. If the community has no real say or influence from the off set, then the word 'engagement' should never be used. The Joseph Rowntree Foundation (1999, p1) argue that "limited consultation, with few real options, which is presented as an opportunity for active participation is likely to produce disillusionment".

Liverpool Vision context

In June 1999 the Urban Task Force, under Lord Rogers of Riverside, presented its report 'Towards an Urban Renaissance'. The objective of the Task Force, as set out in its mission statement, is to identify causes of urban decline in England and recommend practical solutions to bring people back into urban neighbourhoods. It seeks to establish a new vision for urban regeneration founded on the principles of design excellence, social well-being and environmental responsibility.

Liverpool Vision was created as one of two national pilot urban regeneration companies (URCs) following the publication of the Lord Rogers report. The report, which informs the subsequent Urban White Paper (2000), stresses the need for well-designed buildings, streets, neighbourhoods

and districts, as they are essential for successful physical, economic and social regeneration. The Task Force recommended that efforts should be made by URCs to engage people from socially excluded groups in public engagement activities.

Liverpool Vision's Strategic Regeneration Framework, produced in 2000, established goals for inclusive communities and a skilled adaptive workforce able to share in the benefits of sustainable economic growth. It recognised that the strategy for Liverpool city centre must be about people as well as the place and its economy.

An extensive programme of consultation was undertaken to support the production of the Strategic Regeneration Framework, including the creation of a Community Engagement Panel, which we continue to maintain. The Community Engagement Panel has been Vision's most significant investment and, as well as playing a continuing role in the city's regeneration, has attracted interest from other UK cities and regeneration agencies.

The context for engaging communities in the city centre programme is very different to that of a traditional residential neighbourhood, but engagement with the broader range of communities - residents, businesses and people employed in the city – is an important factor in shaping and delivering major projects and the overall programme for the city centre.

Aims and Objectives

Since 2000, Vision has undertaken a broad range of community engagement activity, initially centred on the preparation of the Strategic Regeneration Framework and more latterly focused on engagement with schools and expanding use of Vision's public exhibition area.

The objectives of Liverpool Vision's Community and Education Programme are:

- To capture the ideas and insights of local people, which help shape future plans for the regeneration of Liverpool city centre.
- To encourage 'public ownership' of the programme for the city centre, so that Liverpool residents understand the benefits and opportunities of the regeneration programme.
- To help enhance the breadth and relevance of the curriculum of local schools by giving them first hand experience of the regeneration programme.
- To demonstrate that Liverpool Vision operates in an open and transparent manner.
- To make a particular effort to engage with residents of the established neighbourhoods in and adjacent to the City Centre, communicating with schools and community groups as the mechanism to achieve this.

The Community Engagement Programme

In February 2000, Liverpool Vision commissioned Ceda (Community Economic Development Associates) to provide 'Community Capacity Building and Consultation Services' to support community input into the Strategic Regeneration Framework for Liverpool city centre. Ceda was appointed to design and realise a community engagement programme. The main purpose of this exercise was to enable all city centre users and groups to engage "in the master planning process and with the multi-disciplinary strategic planning team appointed to enable their informed and active engagement in the Strategic Master Planning process and beyond" (Ceda 2000, p2).

The brief given to Ceda stated the purpose of the overall exercise:

"Support the Liverpool Vision strategy for a vibrant regional centre by building capacity for the engagement of user communities in the master planning process

for the city centre and developing the basis for a long term user involvement and consultation strategy."

This exercise complemented the inputs of public agencies along with city centre businesses to the development of the vision. The stated objectives and proposed outcomes of the community engagement programme can be seen in Figure 1.

The aim of the original recruitment process was to:

- Recruit people from as many different city centre user groups as possible.
- To recruit approximately 150 people, with the assumption that some would 'drop out' of the programme.
- To recruit participants within four weeks of the programme commencing in February 2000.

It has been stated "the benefits of maximising representation in the regeneration of the City Centre from the full range of different user groups and communities was recognised from the outset" (Ceda, 2000, p5). The programme aimed to ensure that it was inclusive at all levels, through recruitment and through the timings of meetings, the activities offered and accessibility of the programme itself. Attempts were made to ensure that within the community engagement group there was a balance in terms of:

- Age
- Address
- Ethnic origin
- City Centre usage patterns
- Employment status
- Disability
- Socioeconomic category

As part of the master planning process, Vision undertook intensive work with the Community Engagement Group to help shape the regeneration priorities for Liverpool city centre. This included workshops with master planners and architects, and visits to other UK cities such as Manchester and Leeds to learn from their experience in successful regeneration.

The community engagement activity undertaken by Vision has made the regeneration programme for the city centre more effective and sustainable. This can be evidenced through a number of complementary initiatives designed to involve local people in the transformation of their city centre.

These include:

- The establishment and maintenance of the Community Engagement Panel. Whilst the numbers of people involved has reduced from approximately 400 at the outset to currently 200, those individuals still involved continue to demonstrate a passionate interest in the development of Liverpool city centre. A regular dialogue with the group is maintained through workshops, events and tours.
- The establishment of a fully accessible exhibition area at Vision's office has been a success. Exhibitions attract visitors and demonstrate a positive message about the city to the range of visitors, 3500 annually, and delegations, including groups from Shanghai, Berlin, Amsterdam and Tokyo. Furthermore, the desire to open a public exhibition space resulted in the company moving to bigger premises to realise our ambitions for day to day, long-term community engagement.
- A number of public exhibitions have been arranged to consult on major projects and have captured valuable inputs to shape proposals and assisted the outcome of funding

and planning applications. e.g. the Community Engagement Group has helped to shape key developments such as Kings Waterfront. Following public consultation, design changes were made to the master plan and the new Arena and Convention Centre Liverpool, which was originally on the eastern side of the site, now sits on the city's world famous waterfront.

- The development of an educational programme with local schools designed to meet national key stage curriculum requirements. The production of 'education resource packs' has allowed local school children to learn about subjects such as history, geography, art and design in a way that is relevant to their own lives and city.

Challenges

A Representative Group

One of the key challenges in establishing and maintaining the Community Engagement Group has been the recruitment of a truly representative group.

The recruitment for the group was a two-stage process. The first recruitment methodology - targeting representatives of different user groups identified by Ceda - failed to produce volunteers in the desired numbers. The second method, inviting interest through the local media was more successful in terms of volunteer numbers, but not in terms of creating a heterogeneous group.

Though the recruiters worked hard to recruit from ethnic minority communities, not many participants from ethnic minority communities were finally recruited. The group from its inception was not fully representative of the city. There was, from the very beginning, an over-representation of white participants, with few from ethnic minorities or from communities on the edge of the city centre.

The first stage solicited 75 enquiries and of these 15 to 20 attended at least one event. The second stage led to 315 people registering. Of the total of 391 people who registered a core 285 participants attended at least one event.

Defining A Long Term Role

Whilst the Community Engagement Group played an important role in shaping the regeneration programme, the group's role (following master planning and during implementation) was less clearly defined.

While a significant number of local people remained involved in the Community Engagement Group during implementation, there was also noticeable 'drop off' from people who felt their contribution to the regeneration programme had been fulfilled.

It is therefore vital that a process for managing the expectations of people involved is considered and agreed as part of the planning process.

Without clear communication and understanding, a degree of disillusionment can develop amongst members keen to have the same level of input as during the master planning stage.

Allocating resources

The success of Vision's Community and Education programme has been determined, to a large degree, by management commitment to the programme.

Vision is unique, amongst Urban Regeneration Companies in the UK, in employing a Community and Education Officer to undertake activity with local people and schools.

With pressure on operational budgets, allocating resources to a dedicated community and education resource has, at times, been challenging. With limited dedicated staff resource, the company has to be realistic about its ability to fulfil a very broad

and increasing level of demand.

However, Vision's commitment has been rewarded in a number of ways. The key benefits include ongoing involvement of local people and children (who have a much greater understanding and pride in their city and environment), an improvement in the company's profile and reputation and Vision's work becoming a model of good practice in the UK.

Conclusion

Liverpool Vision recognises the important contribution that local people make in building a fairer, more inclusive society – and the role they can play in helping shape the city's regeneration.

The establishment of the Community Engagement Group, fully accessible public exhibition area, engagement with schools to link regeneration with the national curriculum has brought significant benefits to the regeneration programme.

Furthermore, through our commitment to long-term community engagement, Liverpool Vision has reinforced the importance of Liverpool city centre as the economic hub of the Merseyside region and raised awareness of the opportunities that exist for local people within a successful city centre.

The stated objectives of the community engagement programme were:

- To identify a range of people and organisations who are broadly representative of the main city centre user communities and groups currently excluded from the city centre who might contribute to the Strategic Master Planning process and to future consultation arrangements.
- To identify and establish suitable structures and forms of engagement to support the Strategic Master Planning.
- To provide information, briefing, training and other preparation for engagement in the Strategic Master Planning process and potentially beyond this into the implementation stages.
- To inform the development by Liverpool Vision of a long term strategy for city centre involvement and consultation.
- To leave behind some of the skills which consultants use.
- The proposed outcomes of the exercise which contribute to key Liverpool Partnership Group strategies were identified in the brief as:
- To help to ensure a qualitatively better Master Plan for the city centre.
- To empower user communities and groups currently excluded from the city centre to contribute to the Strategic Master Planning process.
- To endorse and share ownership of the Strategic Master Planning process.

Figure 1: The Objectives and Proposed Outcomes of the community engagement exercise (Ceda, 2000, p3)

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3.11 Sustainability assessment of brownfield regeneration – a review of different approaches

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ABSTRACT

'Sustainability' is not a one size fits all – different objectives will apply to different brownfield sites. A land use, design or construction method proven to be sustainable at one site is not necessarily so at another site. However four metrics of brownfield regeneration sustainability have been developed in recent years: The Sustainability Assessment Tool (SAT) of RESCUE, the Best Practice Methodology (BPM) by the Central Mining Institute (GIG) and the Voivodship Fund for Environmental Protection and Water Management (WFOSiGW), the Rede-velopment Assessment Framework (RAF) methodology developed by SUBRIM and the Sustainability Assessment Workshop of REVIT. Each tends to address stakeholder participation issues differently. Differences in procedures directly influence the type and level of discussion, the legitimacy of decisions taken and the social acceptability of planned actions.

Introduction

Industrial change has resulted in the creation of "brownfield sites" (CABERNET 2007), particularly in the historically industrial regions of Europe. The regeneration of such sites is obviously important, in the context of economic, environmental and social development of the affected regions. It is clear that only the establishment of a common framework for sustainable development and regeneration of brownfield sites will bring the desired results. However, questions regarding the sustainability of these processes have to be addressed and adequate, practical solutions for measurement provided.

One of the most significant inputs to discus-sion about sustainability of brownfield regeneration projects across Europe is provided by the RESCUE project (Regeneration of European Sites in Cities and Urban Environments: 2002 - 2005). RESCUE was a research project funded under key action IV „Cities of tomorrow and cultural heritage" of „Energy, environment and sustainable development" within the 5th Framework Programme of the European Community. RESCUE introduced an integrated approach towards brownfield regeneration, where as an integral part of an analytical sustain-ability framework for brownfield regeneration first, comprehensive definition of sustainable brownfield regeneration was developed. Sustainable Brownfield Regeneration is defined as "the management, rehabilitation and return to beneficial use of brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institu-tionally robust and socially acceptable ways within the particular regional context." (RESCUE 2003, p 153)

This still very broad and general definition was further refined into major fields of work within brownfield regeneration, and led to the definition of sustainability objectives and indicators. RESCUE's definition of sustainable regeneration is not meant to imply that sustainable development should be regarded as a situation that can be achieved or a destination that can be reached at some time in the future. Rather it is a road map through the ever-competing interests of the four dimensions that seeks to optimize the impacts and benefits while preserving freedom of action and the range of options of future generations. The focus should not be laid on situations regarded as optimal from today's perspective, but on the potential flexibility of the instruments used to approach sustainable development. Regarding attempts at sustainable brownfield regeneration as learning opportunities also means that the understanding and characterization of sustainability, the instruments for its implementation and the indicators for its observation will change over time. Of course sustainability can only be defined from today's perspective. Thus the process of sustainable development requires a continuous reevaluation in order to adapt to changing contexts, priorities and developing knowledge and technology.

Regeneration involves perturbing the urban system's social, environmental and economic dimensions and can require or cause changes in institutional structures. A system approach to predicting the impacts of regeneration has been pro-posed by Nathanail (2005) and is being developed by the University of Nottingham into a neighbourhood scale sustainability prediction tool. At the site project scale various international approaches have been developed and these form the focus of this paper.

Sustainability objectives are not equally relevant for all brownfield sites and locations. Their relative importance also varies from location to location and also from stakeholder perspective to stakeholder perspective. A land use, design or construction methodology that proved to be sustainable at one site is not necessarily appropriate for another site, context, time or mix of stakeholders with a different set of priorities (Franz et al. 2006, p. 142). During the last years different projects were active in developing a procedure to assess the sustainability of a site in a way that takes this into account.

This paper reviews and compares four assessment approaches developed under different research initiatives. As well as introducing each method, this study also presents available examples of their practical implementation.

The first approach to be considered was introduced by RESCUE: The Sustainability Assessment Tool (SAT). The tool is based on a framework of objectives, indicators and best practices that reflect the multidimensional and multistakeholders complexity that characterises brownfield regeneration and aims to assess future brownfield regeneration projects in terms of site/local specific sus-tainability (Glöckner et al. 2004; Franz & Nathanail 2005; Franz et al. 2006).

A modification of the RESCUE SAT was proposed jointly by the Central Mining Institute (GIG) and the Voivodship Fund for Environmental Protec-tion and Water Management (WFOSiGW): The Best Practice Methodology (BPM). This approach fo-cusses on the specific requirements of funding institutions (Sokół 2004; Sokół 2005).

An application of the RESCUE SAT is next con-sidered, this time within the context of yet another European Project - REVIT (Towards more effective and sustainable brownfield revitalisation policies). In October 2005, a modified version of the RESCUE SAT was implemented in Stuttgart (Langer et al. 2006a; Langer et al. 2006b).

The last approach considered in this comparison study is the Redevelopment

Assessment Framework (RAF) methodology developed by the British EPSRC funded-network SUBRIM (Sustainable Urban Brownfield Regeneration: Integrated Management) (Pediaditi et al. 2005; Pediaditi et al. 2006).

RESCUE SAT

The methodology developed in RESCUE to assess future brownfield regeneration projects in terms of site/local specific sustainability is called the Sustainability Assessment Tool (SAT). RESCUE rejected the concept of developing a fixed tool such as a checklist with quantitative indicators intended to be universally valid for all sites in all regions. Answers on such questions as what kind of land use is appropriate or sustainable on a given site have to be rather answered on a site by site case including the views of the relevant stakeholders. The SAT is a methodology to consider these variable parameters and conflicting priorities to assess future brownfield regeneration projects in terms of sustainability.

The SAT includes three steps:

1.Actor collaboration to set priorities on aspects of sustainability: The relative importance of the objectives has to be defined for each individual brownfield project - the actors have to set priorities on aspects of sustainability. An Actor Collabo-ration Questionnaire which includes weighting questions for the workshop participants with regard to infrastructure development and planning measures is used for this. This will happen by means of a workshop in an early stage of the project, e.g. when only a first project idea exists. Additionally to the core actors (owner of the site, investors, developer, etc) a diversity of participants is needed for the workshop, recognizing that actors can be individuals, social groups, organizations, etc. There are different levels of priorities that make sense to get from the participants of the workshop. For example in the "Sustainable land use and urban design on brownfield sites" weighting questions there is not only asked for the priorities on the different objectives, but also to allocate points in checklists. A good example is Objective 4.4: „To achieve benefits for and prevent adverse impacts on the local neighbourhood." For this question the participants are asked to allocate ten points to the following benefits for the local neighbourhood which should be created/ supported by the project (with regard to their impor-tance):

- Jobs
- Facilities to improve health, ease and recrea-tion (e.g. small streets, land use that causes only little traffic, lowemitting enterprises, green areas, medical infrastructure)
- Sports facilities (e.g. sports fields, fitness centre)
- Supply with goods and services
- Leisure and entertainment (e.g. restaurants, pubs, cinema)
- Educational and social infrastructure (e.g. schools, kindergartens, centre for young people, doss houses)
- Family- and child-friendly environment (e.g. small streets, land use that causes only little traffic, social infrastructure, playgrounds, green areas)
- Increase of property values
- Security, reduced crime (e.g. more social control, avoiding dark spaces)
- Identity (e.g. preserving and reusing historical buildings)
- Increased number of inhabitants (as a synergy effect for neighbouring uses like commercial or industrial areas)
- Others

It is very important to know about the

priori-ties of the participants of the workshop on this detailed level. If the question is only focusing on the need for benefits everybody will agree, but in order to achieve usable results the benefits need to be specified. Therefore, checklists were developed for all the objectives which should be weighted. The participants of the workshop need to prioritise the variations on this detailed level objective by objective.

2. Funding / permission application by the project developer: On the basis of the weighed aspects of sustainability and all sustainability objectives the project developer elaborates a funding / permission application. A questionnaire is compiling all RESCUE sustainability objectives and/or indicators, which are to be addressed by the project developer in form of statements, situation descriptions, and planned measures. If the developer neglects or bypasses the outcomes of the workshop, he needs to justify his decision in the application towards the funding institution and/ or permission authority.

Quantified assessment model (QAM) for decision making: The application has to be assessed by a funding institution and/or permission authority. This institution will have to judge how sustainable the project is and how the public priorities were taken into account. The third stage of the SAT, the Quantified Assessment Model to aid decision-making (QAM), takes these weightings and converts them into workable standardised data. The evaluator (working on behalf of the funding institution or permission authority) weights the various elements of the projects according to the qualitative arguments and explanations provided by the project developer. The two sets of weightings (actors and evaluators) are then used to cal-culate the total project score. In this way it becomes possible to benchmark the sustainability of the project as a whole without generally benchmarking individual indicators. The results emerging from the QAM form the basis of whether the funding application process for the project is successful or

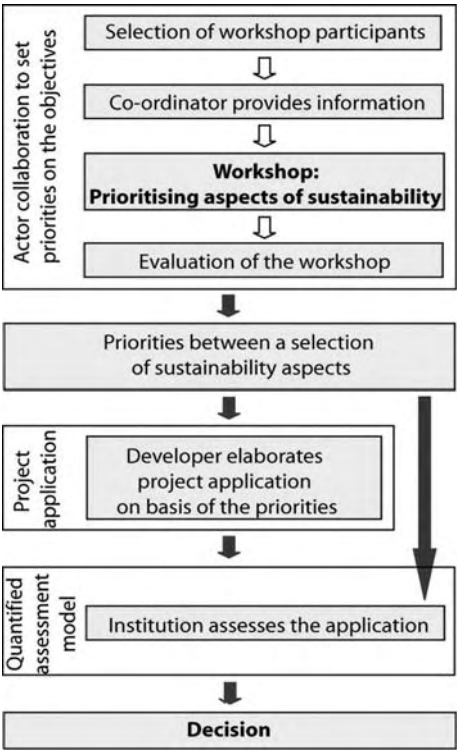

Figure 1: Overview: The SAT-procedure. (FRANZ et al. 2006: p. 144)

not. The target of the QAM is to check in a standardised way, if a brownfield regeneration project achieves a certain sustainability benchmark. The funding decision among those projects, that achieve this benchmark and therefore fulfil the sustainability standard of the funding institution, lies outside of the SAT. The order of events can be seen in Figure 1.

The Sustainability Assessment Tool was tested in a trial at the Mine Radbod in Hamm, Germany, in June 2004. The trial was used to check the practical applicability of the results of the SAT, which had been elaborated so far. The participants of the trial were representatives of the regeneration project Radbod. As the project Radbod is today almost finished, it was organized as a roleplay. The participants were the original actors involved in the project. The applicability of the SAT was valued by the participants as to be complete. But the participants recommended

that the wording and structure of the ACQ needs to be simplified. The questions must be defined understandable for lay-persons. There must be no ambiguity in the interpretation of the questions (Franz & Na-thanail 2005, 26-29).

BPM

The Best Practices Methodology (BPM) was proposed jointly by Central Mining Institute (GIG) and the Voivodship Fund for Environmental Protection and Water Management (WFOSiGW) in Katowice, Poland. The,BPM, based on the SAT, combines findings of another research project dealing with regeneration of postindustrial sites in Europe (MASURIN) with specific requirements of a funding institution - WFOSiGW. It is underlined by the au-thor that proposed methodology was also influ-enced by such supporting tools like LCA (ISO 14040 series and specific software), sensitivity analysis and environmental impact assessment.

This methodology aims to assess quality and sus-tainability of brownfield revitalisation projects, where each funding organisation can review the project using own policy and priorities weights. BPM is build around the concept of a holistic brownfield regeneration project developed by RESCUE. The sustainability objectives and indica-tors proposed by RESCUE are used, but they can be modified to fulfill specific requirements of par-ticular projects.

The modified procedure combines qualitative and quantitative approaches and comprises two steps:

Step 1 – prioritization of sustainability objectives by stakeholders: This process takes place during a one day workshop organized in the initial phase of the revitalisation process. The workshop is attended mainly by institutional stakeholders and aims to reveal their priorities concerning the objectives for sustainable development of the site and to reach compromise between selected priorities, evidenced by a set of common priorities for the site. During the workshop a moderator presents basic information about the site and the project to the participants. After general discussion all stakeholders are asked to fill a questionnaire to express their opinions regarding the project and priorities of development. Through structured discussions a set of common priorities for the site should be established.

Step 2 – evaluation of quality/sustainability of revitalisation projects: This process takes place in later stages of project development (Orientation/Synthesis) and can be carried out by project developers (self-evaluation), stakeholders or by funding organizations (funding decisions). The proposed method of evaluation should enable quality improvement and also ensure that sustainability objectives set up for this project (step 1) are achieved (Implementation phase) (Sokół 2004).

In BPM five revitalisation aspects are evaluated with the help of the indicators. These indica-tors are scored using checklists (qualitative and quantitative questions are used) and then are weighted. The evaluation of the sustainability of revitalisation project is based on sum of weighted scores of the indicators. The process of revitalization is considered as sustainable if the following Best Practice criteria are met:

- Minimum Acceptance: 40 _ scores > 25
- Good Practice: 40 < scores _ 60
- Best Practice: scores > 60

Unfortunately the description of the procedure (Sokół 2004) does not make clear how this criteria are set.

In December 2004 BPM approach was implemented to assess sustainability of following regeneration projects: in City of Bytom Hala sportowa w Dolomitach Sportowej Dolinie (Dolomites Sports Valley) and in City of Sosnowiec Revitalisation of former coal mine „Sosnowiec".

Regarding methodological requirements of taken approach, full projects validation took place through:

- prioritization of sustainability objectives by stakeholders (workshops)
- quantitative assessment by GIG, stakeholders and funding organizations (specifically designed questionnaire to weight relevant objectives and indicators)

In both cases workshops where hosted by city councils and led by independent, professional moderators. The workshop in Sosnowiec was attended by 28 people, who represented following categories:

- local self-government
- local business
- public institutions
- local associations, organisations and media
- city council

In case of Bytom 21 people from following groups participated :

- representatives of city council
- representatives of local business
- representatives of local self-government

After workshops were finished, participants were asked to evaluate quality and relevance of proposed approach in terms of used techniques and tools, and also organisational matters of events. Full evaluation of both workshops was made by assisting researchers from CMI and is based on analysis of prioritization questionnaires filled by participants, evaluation questionnaires and also observations made by moderators.

Results of that evaluation show that:

- the applied BPM methodology was perceived to be too complex and time consuming
- the amount of presented information was assessed as excessive and not possible to be assimilated properly during one event
- prioritization questionnaires should be adjusted to specific local condition before workshop
- all sustainability objectives and indicators should be explained in a simple, easy to understand way (not all participants understood the technical terms used)
- the most challenging aspect is the involve-ment of all relevant stakeholders, especially representatives of local government and local business. The right number and profile of participants are crucial for a fruitful process
- participants agreed common priorities in terms of sustainability objectives however it was very difficult to reach consensus about partial indicators
- the sustainability objectives and partial indicators were assessed as „correctly selected"
- overall assessment of both workshops was very positive – participants highly valued those events as an opportunity to express their opinions about planned actions

The sustainability assessment (2nd step) of considered projects was carried out by GIG, representatives of city councils directly involved in re-generation processes and also – in case of city of Bytom - other stakeholders (representatives of local business, representatives of local self-government). All participants have used weighting algorithms to evaluate prepared for those projects funding applications. Quantitative results showed that project Revitalisation of former coal mine „Sosnowiec" achieved 55 points and ac-

cording the Best Practice criterions is considered as „good practice". Project Hala sportowa w Dolomitach Sportowej Dolinie achieved 56,6 points and according the Best Practice criterions is considered as „good practice" (Sokół 2005).

However, the lack of direct citizen participation in the BPM-procedure can limit the confidence of the sustainability evaluation. Conversely, the RESCUE approach assumes that target selection should be based on a gathering of technical experts, decisionmakers, and citizens from various backgrounds. Furthermore it is unclear how the Best Practice criterions are set and if they can be useful for different kinds of brownfield projects.

REVIT

Special example of approach which aimed to assess sustainability of regeneration plans for a brownfield site, demonstrates the case of the planning workshop organized by project REVIT (Towards More Effective and Sustainable Brownfield Revitalization Policies) which is funded by the Interreg IIIB programme.

By definition a workshop on itself does not constitute a methodology for sustainability as-sessment; however lessons learnt from this case study can definitely contribute to the discussion about approaches undertaken to assess sustainability of brownfields regeneration.

In October 2005 a sustainability assessment workshop was implemented at the site ''Güter-bahnhof Bad Cannstadt'' — a former goods station in Stuttgart (LANGER et al. 2006a; LANGER et al. 2006b). As the workshop showed fundamental differences to the original SAT, it is justified to present it as separate approach. The workshop was addressed to general public however evaluation of participants composition shows that the event should be categorized as expert participation (as only institutional stakeholders participated) (Franz & Okuniek 2006).

The main purpose of this workshop was to present a feasibility study and set up priorities on sustainability objectives and indicators in terms of site redevelopment in three thematic areas:

- Urban development and planning processes
- Environmental and social issues
- Economy and Traffic

After some introductory presentations, the participants were assigned to specific working groups. The process of randomized assignation supposed to produce groups of equal size and comparable structure. The discussions which took place in the working groups were target orientated and aimed to select sets of priorities for considered thematic areas. In the final session, the results were briefly presented by the moderators (Langer et al. 2006b).

It should be highlighted that the response to the workshop was very good: although only personal letters were sent to publicize the event - almost 100 people attended. An evaluation of the list of attendees showed that 30% were employed by the municipality of Stuttgart, 10% of participants attended the event as representative of a political party and less than 10% of participants attended the event as representative of citizens` initiative: the Veielbrunnen Citizens' Initiative (Franz & Okuniek 2006)

The remaining body was composed of representatives of the economy, planners, and scientists. An analysis of the evaluation questionnaires filled by participants, showed very positive results. A great majority of respondents assessed this op-portunity to express their opinions as ‚adequate' or even ‚more than adequate'. More than 70% of respondents rated selected for urban planning sustainability objectives and indicators as ‚very helpful' or ‚helpful', however their concrete application in the project Güterbahnhof Bad Canstadt was judged more critically.

It has to be mentioned that when the REVIT planning workshop took place, a master plan for the site had already been adopted by the local council, while the content of a feasibility study reached the public debate on that occasion for the first time. (LANGER et al. 2006a: 6). For the city of Stuttgart this workshop was an innovation. "So far, public events and participation processes dealing with issues of urban development in Stuttgart were mainly conducted in conformance with relevant legal regulations and requirements laid down in the Building Code. For this reason, events such as the REVIT Planning Workshop do not form part of the administrative routine (…)." (LANGER et al. 2006a: 6)

RAF

The final approach considered in this compari-son study is the Redevelopment Assessment Framework (RAF) methodology developed by a the British EPSRC funded SUBRIM consortium (Sus-tainable Urban Brownfield Regeneration: Integrated Management). The RAF facilitates the development of site specific indicators, using a par-ticipatory approach, which allows for the monitoring of the sustainability of Brownfield Redevelopment Projects in an inclusive way throughout a site's life cycle.

The RAF has a lot in common with the tools described above. However, while the SAT, the SAT-BPM and the REVIT-Tool are mainly developed for the start phase of a brownfield redevelopment project, the RAF-process "can and should be undertaken or reviewed at each phase of the BRP life cycle." (Pediati et al. 2005, p. 177-181). Further-more the RAF is not meant to be realized with a one day workshop, but with a minimum of two half-day workshops.

The RAF consists of six phases (Pediati et al. 2005, p. 177-181):

1. Team building: Identification of relevant stakeholders and creating a group of approximately 12 stakeholders.

2. getting the facts right: Compiling of the relevant information and giving it to the stake-holders prior to the workshops.

3. preparing the ground: "adequate considera-tion of all strategic documentation relating to the development which has, in most cases, already been subject to public consultation." (Pediati et al. 2005, p. 179)

4. setting the priorities in a workshop: "the stakeholders first identify and agree the principles of sustainable development, which they regard as relevant to the specific BRP, in a deliberative manner. To facilitate decision-making over the priorisation of the principles, a ranking tool which consists of a matrix has been developed." (Pediati et al. 2005, p. 179) After this the "stakeholders collectively iden-tify the main impacts, both positive and nega-tive, perceived or expected to occur, as a result of the BRP. […] Stakeholders choose the most important issues for which they believe monitoring indicators should be developed." (Pediati et al. 2005, p. 179) At the end of this phase a list of prioritized issues which are judged to be the most important for the project by the stakeholders.

5. designing the indicators: In a meeting between the lead partner and the relevant LA officer the indicators are designed on the basis of the priorities set by the stakeholders. As a further help an indicator development tool - it includes a compendium of existing indicators - was developed.

6. putting it all together: In a second workshop the list of indicators is presented to the stakeholders. They have the chance to modify the list.

> "Having identified the final list of indicators, participants consider the targets which would signify a sustainable or unsustainable state for each individual indicator, taking into account local conditions." (Pediati et al. 2005: p. 181)

This list of indicators can then be used for the evaluation of the sustainability of the brownfield project. "The RAF is designed to be an iterative process to be undertaken at each point in the BRP life cycle, which is compatible with the planning process and the forthcoming changes." (Pediati et al. 2005: p. 181)

Comparison

Presented in this study approaches for sustainability assessment shows many obvious and superficial similarities, however the most important parameters like scope of exercise, objectives and indicators used to define sustainability, type of evaluation and implementation of participation principles make them significantly different.

All methodologies aim to evaluate sustainability of regeneration projects but as the RAF intents to set up priorities and monitor project performance across its life, SAT and BPM translate results of this process on funding application language. Consequently type of evaluation – the RAF only qualitative but the SAT and the BPM also apply quantified measures - has to meet these specific requirements. The procedures of quantified evaluation of regeneration projects in case of the BPM and the Quantified Assessment Model (QAM) of the SAT allow comprehensive monitoring of processes and effective comparisons of achieved results.

All discussions about sustainability assessment methods always refer to conditions which have to be met if process attempt to be considered as sustainable - the sustainability objectives, against which project parameters will be weighted.

The RAF uses project specific objectives and indicators, correlated with principles of sustainable development set up by the Government for considered area, while the SAT assess sustainability of regeneration projects against objectives and indicators developed by interdisciplinary team of experts involved in the RESCUE project. The BPM demonstrated mixed approach, where the RESCUE objectives are modified accordingly to local condi-tions. In case of the REVIT workshop, the objec-tives and indicators were defined specifically for the site, and these indicators were already partly combined with benchmarks.

Although priorities selection, as well as sustainability assessment is done in each case by stakeholders, all methods tend to address participation issues differently. From one side of the scale we have public participation open for all institutional and non-institutional, organized and non organized stakeholders, recognized rather as community involvement (SAT) through expert's (REVIT) and community representatives participa-tion (BPM) to another side of the scale where, the RAF promotes main stakeholders group's representatives participation, restricting number of at-tendees to 12 experts per workshop.

Concerns about right number and composition of participants were expressed by the BPM authors however clear indications for organizations of future assessments were not given.

Like in the BPM and the RAF this can limit the confidence of the sustainability evaluation. Con-versely, the RESCUE approach assumes that target selection should be based on a gathering of technical experts, decisionmakers, and citizens from various backgrounds.

Also the stage when stakeholders are involved in process of regeneration makes significant difference in terms of type of decisions which are left for public consideration i.e. the REVIT workshop was held after all major aspects of the project have been defined in principle on the political level, while the RESCUE approach and

Table 1 Comparison of different sustainability assessment approaches

	SAT	BPM	RAF	REVIT
General structure	Preparatory stage: Selection of stakeholders and data collection Step 1 - Actor collaboration – one day workshop Step 2 - Funding/ permission application preparation by the project developer Step 3 - Quantified Assessment Model (QAM) for funding institution	Preparatory stage: Selection of stakeholders and data collection Step 1 – prioritization of sustainability objectives by stakeholders – one day workshop Step 2 – quantified evaluation of quality /sustainability of revitalisation projects	Preparatory stage: Phase 1. Team building Phase 2. Data collection Phase 3. Preparing the ground Participatory development of indicators Phase 4. setting the priorities – half-day workshop Phase 5. designing the indicators Phase 6. final selection and evaluation of the sustainability indicators – second half-day workshop	Preparatory stage: Selection of stakeholders and preselection of objectives and indicators One day workshop: Feasibility study discussion and priorities selection
Aim	To increase the quality of the planning process of brownfield projects. To assess sustainability of brownfield regeneration projects and to provide support for funding and/or permission decisions	To assess quality and sustainability of brownfields revitalisation projects, where each funding organisation can review the project using own policy and priorities weights	To inform stakeholders about the sustainability performance of a site across its life cycle and facilitate the development of site-specific indicators To increase the quality of the planning process of brownfield projects.	To present feasibility study and set up priorities on sustainability objectives and indicators for site regeneration. To increase the quality of the planning process of brownfield projects.
Scope	Funding application preparation using outcomes of project evaluation by stakeholders	Qualitative and quantitative project performance evaluation by stakeholders and funding institution	Project performance evaluation by stakeholders	Dissemination information about planed activities and evaluation by stakeholders
Type of evaluation	Two fold: - Qualitative: through participatory process - Quantitative: Quantified Assessment Model (QAM) for funding or permitting institution	Two fold: - Qualitative: through participatory process - Quantitative: specified algorithms to weight selected objectives and indicators	Qualitative: through participatory process	Qualitative: through participatory process
Compliance with funding body requirements	SAT proposes procedures for quantified evaluation to funding institution	BPM incorporates requirements of relevant funding institution	None	None
When is applied	Should be used in very early stage of the project: if it is used for a more advanced project, it serves for evaluation purposes	1 step takes place in initial phase of revitalisation process while 2 step should be applied on latest stages of project development	Can and should be undertaken or reviewed at each phase of the BRP life cycle	Planning and design phase: when masterplan was already adopted
To whom is addressed	Developer/ owner/ funding provider/ stakeholders	Developer/ owner/ funding provider/ stakeholders	Developer/ owner/ stakeholders	Developer/ owner/ stakeholders
Used technique of participation	Workshop (1 day)	Workshop (1 day)	Workshop (2days)	Workshop (1 day)
Who participates?	Institutional and non-institutional stakeholders	Institutional stakeholders	representatives of various groups of interests	Institutional stakeholders
Recommended number of participants	No restrictions	Not specified	Number of participants specifically restricted - around 12 experts	No restrictions

Evaluation of participatory approach	Post-workshop evaluation questionnaire	Lack of information	Lack of information	post-workshop evaluation questionnaire
Objectives and Indicators	Relevant to the project, however selected from set of sustainable objectives and indicators developed by RESCUE. Addressed by the project developer	Based on sustainable objectives and indicators developed by RESCUE, modified and extended according specific project/funding institution requirements	Project specific – proposed by process facilitators for discussion and selection during workshops.They are correlated with governmental objectives/principles of SD	Set up by workshop organizators. Discussed and overworked during the workshop
Practical applications	Trial as a role play in the former mine Radbod in Hamm, German, in 2004.	Former mine Sosnowiec in Sosnowiec and Dolomites Sports Valley in Bytom, Poland, in 2004	Yes, in UK	Former Goods Station Bad Cannstatt in Stuttgart, Germany, in October 2005
Comments	The SAT combines a classic participatory workshop with the process of application for funding.	The BPM combines a workshop with the process of application for funding.	The RAF combines classic participatory workshops with a project performance evaluation across the lifecycle of a project	This is not a methodology for a complete sustainability assessment, but focuses on the methodology for a objectives/indicators workshop.

the BPM features a workshop at a very early stage of the project, i.e. at a time when an idea has been conceived but no master plan has been developed yet. The RAF intents to be linked even closer with processes taking part on each stage of project development as this exercise can and should be undertaken or reviewed at each phase of the project life cycle.

Adapted participation procedures, number and composition of participants, stage of project development, when stakeholders are involved, not only shape type of discussion, but first of all give legitimacy for taken decisions and ensure social acceptance for planed actions.

Conclusions

Numerous inventories of sustainability indicators for different topics have been developed over the years. The question is how these indicators - and the objectives they are based on – can be "integrated into an answer as to whether something is sustainable or not" (Morse et al. 2001: p. 1) and furthermore how this decision can influence project or land use planning practice. This holds true for the brownfield regeneration. How sustainability can be assessed for brownfield regeneration was discussed in different research projects and networks. The EU-funded project RESCUE developed a set of indicators and the Sustainability Assessment Tool, the Interreg IIIB REVIT developed a set of site specific indicators which were further developed in a participatory workshop in Stuttgart. In Poland a modification of the RESCUE SAT – the Best Practice Methodology (BPM) - was proposed jointly by the Central Mining Institute and the Voivodship Fund for Environmental Protection and Water Management, both in Katowice. SUBRIM developed the Redevelopment Assessment Framework methodology.

All four approaches to the assessment of brownfield project sustainability are based on the understanding that not all sustainability objectives can not be equally relevant for all brownfield sites. All four approaches concluded that the definition and weighting of site specific indicators should be carried out through a stakeholder participation process. Each case study described above involved participation, participation issues were tackled differently. These differences in procedure directly influence the type and level of discussion, legitimacy of decisions taken and at the same time the social acceptability of planned actions. While all four approaches are still at the experimental stage, the SAT has been trialled on live projects and constitutes a 'proof of con-

cept'. The SAT – or modifications thereof – has had the widest take up and is gaining increasing international recognition and acceptance. However, the evaluations of the different workshops showed that there was constructive criticism about details of the approaches but that the overall approach of workshops as part of a sustainability assessment was regarded as fruitful by the participants. The different ideas about how to implement the prioritisation and the project assessment in the compared approaches show that the use and the further development of the presented tools is clearly a learning process.

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4

Financing, Funding and Real Estate Market

4.1 An early assessment of JESSICA: Love at first sight?

Nico Groenendijk

ABSTRACT

Because of the specific nature of brownfield regeneration specific financial techniques and instruments are required. The use of such techniques and instruments should result in efficient and equitable cost-, profit- and risk-sharing arrangements between public and private actors. In this paper the main elements of such PPP-arrangements for brownfield regeneration are discussed first. Attention is then paid to the new JESSICA programme (Joint Support for Sustainable Investment in City Areas). It is argued that the revolving fund mechanism that is at the heart of JESSICA does solve some of the specific problems associated with financing brownfield revitalization but certainly not all. Although clearly enhancing the financing potential for brownfield regeneration, JESSICA is not necessarily adequate in establishing equitable and efficient financial arrangements on the project level. Secondly, JESSICA probably overkills, in the sense that the JESSICA framework is quite complicated and could well become a straitjacket rather than a tailored suit.

Introduction

In 2006 the European Commission introduced JESSICA: Joint European Support for Sustainable Investment in City Areas. JESSICA aims at innovative financing of urban redevelopment, including brownfield regeneration, by using revolving funds to provide loan financing. Right now (February 2007) the exact set-up of the JESSICA programme is not entirely clear. A Commission Regulation is expected soon as well as a preliminary evaluation of the programme.

This paper discusses whether JESSICA is suited for solving the specific problems associated with financing brownfield revitalization. The paper is structured as follows. First, an overview is given of the main financial issues involved in brownfield regeneration. Secondly, JESSICA is dealt with. What does JESSICA aim for? How does it work? Thirdly, the suitability of JESSICA is critically assessed.

Financial aspects of brownfield regeneration

If brownfield revitalization was always commercially profitable in a straightforward way, brownfield sites would self-develop, and such re-development would be largely private-driven. Unfortunately, only a small minority of the brownfield sites are of the self-developing kind (so-called A-sites in the CABERNET terminology). If the land value after reclamation is not outweighed by the reclamation costs, commercial development is not likely (B- and C-sites).

Taking private development as point of departure, brownfield regeneration can encounter two types of market failure. First there are externalities: costs and/or benefits that are highly relevant to the project as such but are not taken into

account by the private developer. Social costs and benefits (i.e. costs and benefits to society at large) may be disregarded. Examples are the benefits resulting from economies of scale in remediation efforts and the enhancement of social cohesion in communities by brownfield revitalization. Another possibility is that private developers do not take into account costs and benefits to other private and public parties. Example are the cost-saving effect of a more efficient use of existing infrastructure after regeneration has taken place, new business opportunities and the increase in tax revenues for local government. With externalities occurring, commercial viability of brownfield regeneration does not necessarily correspond to economic viability. Projects may be economically viable (in the sense that total benefits for all parties involved exceed total costs) and at the same time be unprofitable from the perspective of a single actor. What we need then are financial arrangements by which costs, benefits and profits are shared on a more equal basis, making all parties better-off.

Secondly, brownfield regeneration involves uncertainty, risk and ignorance. Such uncertainty concerns the impact of actual and acceptable site contamination on redevelopment costs, which in most case only becomes clear once redevelopment has started. Such uncertainty also concerns (future) liability issues and their impact on future land value. When dealing with risk and uncertainty, it is important that those actors that can influence the level of risk and uncertainty are directly involved in the project and that there is an efficient and equitable risk-sharing arrangement for risks that cannot be borne by single parties.

Financial incentives

In the case where private development is hampered by the market failures addressed above, there are some rather straightforward financial incentives that public authorities can use to win private developers over, like cash grants, loans, tax incentives and capital attraction incentives (loan guarantees, companion loans). Moreover public authorities can provide risk insurance and relief, liability relief and planning an land assembly assistance. See Groenendijk (2006) for a more detailed overview. The idea here is to internalize (future) public benefits by bringing additional (current) benefits of brownfield redevelopment to the private developer.

Models of cooperation

Whether a brownfield regeneration project is primarily undertaken by a private developer or a public developer often depends on the ownership issue. If the site is publicly owned, it is relatively easy to take into account all public and social costs and benefits. Still, bringing private actors (and their costs and revenues) into the equation makes perfect sense. This could be done in the operating and maintenance phase; seeking (partial) private financing is yet another possibility.

The two cases described above can be labelled private development with public assistance respectively public development with private assistance. As such they do not really represent real public-private partnerships (PPPs). The idea with PPPs is that public and private parties cooperate throughout the entire project cycle or main parts of that cycle. That project cycle consists of taking the initiative, planning, financing, the actual site (re)development, building, and operating and maintenance of commercial facilities and of public facilities. Two different types of PPP can be discerned.

First there is PPP for Procurement & Concession. The idea here is that public authorities are the lead project partner but with procurement & concession of specific project phases to private parties. This is what the European Commission (2004) has labelled purely contractual PPPs. Examples are DFBT-projects (turnkey-projects, in which the private actor designs, finances, builds and transfers the

site) and BOT-projects (build, operate and transfer). In our view, projects that only involve the private sector in the financing phase, are not real PPPs.

Secondly, there is PPP Alliance, in which private and public parties cooperate on an equal basis throughout the entire project cycle. This is what the European Commission (2004) calls institutionalised PPPs.

Table 1 shows the main similarities and differences between the four models of cooperation.

Table 1: Four models of cooperation

Stage/model	I. Private development	II. Public development	III. Procurement & Concession PPP	IV. PPP Alliance
Initiative	Private	Public	Public	Private, public
Planning	Private, with public assistance	Public	Possibly private	Private, public
Financing	Private, with public assistance	Public, with private assistance	Possibly private	Private, public
Site development	Private	Public	Possibly private	Private, public
Building	Private	Public	Possibly private	Private, public
Operating & maintenance (commercial facilities)	Private	Private, public	Possibly private	Private, public
Maintenance of public facilities	Public	Public	Public	Private, public

These four models are of course archetypical. In practice two or more models may be combined. For instance, within a public development the planning and financing may be a cooperation between the public and the private sector, with the site development being taken care of by government, and building activities being procured to private parties. Alternatively, within a Alliance model site development may be procured to a specialized remediation contractor.

Financing techniques for PPP

If a project is developed publicly (with private assistance) or by means of PPP, single financial incentives are not sufficient anymore. More complicated financing techniques are needed, very often in combination with one another and with the financial incentives mentioned.

Tax increment financing

Tax Increment Financing (TIF) has been used in the US for a variety of economic revitalisation efforts (Bartsch & Wells, 2003). TIF is built on the idea that a brownfield initiative will create new value and that this future value can be leveraged to finance some of the activities needed for redevelopment. Central to TIF is the anticipated growth in taxes the completed project will generate. As a first step government determines the property tax income from a TIF district (different taxes like corporate taxes or sales taxes could also be used). As investment in the TIF district increases and the tax base improves, tax revenues beyond the original base level —the increment— can be linked to these investments.

Obviously, there is lag between investment and tax increment. Subsidies, tax incentives, soft loans result in higher expenditure and/or lower revenue during redevelopment and higher tax revenue at a (much) later stage. Typically, TIF uses a 10-25 year time span. The costs of prefinancing can simply be borne by government, or can be by-passed by means of using TIF bonds, that are issued by (municipal) governments that use the tax increment to pay off the debt. These TIF bonds are issued for the specific purposes of the redevelopment: acquiring and preparing the site, upgrading utilities, streets,

or parking facilities, and carrying out other necessary site improvements. Special purpose bonds such as TIF bonds can be an ideal tool for brownfield projects, and can be combined with other types of funding, such as grants or loans.

One of the main advantages of TIF is that all kinds of positive externalities can be captured and internalized. Setting up and managing TIF can however be complicated. It requires a high level of technical expertise. Moreover, actual tax increments may fall short of expectations, if the redevelopment project fails or its economic impact is less than expected.

TIF as it was described above is project-specific, with the tax increment of a specific redevelopment project being used to offset the projects investment. TIF can also be used as a revolving TIF, in which case the tax increment caused by an earlier project is used for investment in new projects.

Revolving Loan Fund

A Revolving Loan Fund (RLF) generally is a fund that is formed with initial seed capital and then used to make "soft" loans for brownfield clean-up. The fund is replenished as loans are repaid, with the repayments that are ploughed back into the fund being used to make new loans for clean-up. Governments can jump start a RLF by providing the initial seed capital, but large remediation contractors, private developers, and financial institutions can also be involved as initial financiers.

Benefit sharing & claw-back

If public funding is offered to brownfield redevelopment, it is possible to impose claw-back provisions if actual costs are lower than expected, or if values are higher. The idea here is to make sure, through subsidies or other financial means, that private developers "get" the benefits they need, but to cream off "excess" benefits. Benefit-sharing is often used with subsidies but can also be used in the case of loans (with the level of repayments being determined by the level of benefits).

Development charges

Yet another way for the public sector to pick up the uplift in value due to specific redevelopment activities is the use of development charges, of which there are two main types (The Allen Consulting Group, 2003):

- developer charge. Developers are asked to pay for their fair share of facilities and services which will be beneficial to their project. This charge is a "price" paid by the developer based on the user-pays-principle;
- cost impact mitigation payments. The developer is required to meet the costs arising from the unanticipated demands of the development or to compensate for the detrimental environmental effects of the project (polluter-pays-principle).

Development gains taxes are a mixture of Tax Increment Financing (TIF) and development charges. They are similar to TIF in that they are based on (expected) increases in property value. They have in common with developer charges that they are linked to specific events in the development process, for instance the granting of full planning permission. An example of a development gains tax is the proposed UK Planning Gain Supplement (HM Treasury, 2005).

(Integrated) contracts

If PPP Procurement & Concession is chosen as the development model, the main financial instrument used will be contracting. If more than one stage of the project-chain is put in the hands of the same contractor, these contracts are called integrated contracts. So far, experiences with DBFM contracts have largely been limited to larger infrastructural projects. Within that context, basically, three types of fee

have been used (PPP Knowledge centre, 2003):

a. Availability fee. Most DBFM contracts involve a payment regime based on availability and performance. If only part of the infrastructure is available for use, the payment is reduced by an amount proportional to the non-availability. In extreme cases this may mean that no payment is made at all. Corrections for poor or substandard performance are often made by means of a penalty points system. In extreme cases, substandard performance may even lead to cancellation of the contract;

b. User/consumer fee. The most obvious example is the use of tolls. By using tolls, the government can reduce the investment cost for the project – provided that the volume risk can be predicted with a reasonable degree of certainty. It is the degree to which the service-provider can generate revenues from a concession that determines the amount of additional government funding that is required to make the project viable;

c. Mixed user fee. In the case of projects in which volume risks are a factor it is possible to share these risks. In such cases a 'shadow toll' can be levied. This is a system in which the government pays the service-provider a fee for every registered user of the infrastructure concerned. This can be done by introducing a mechanism whereby the risk of extremely low traffic volumes and the benefit of extremely high traffic flows can be shared between the project consortium and the government.

Translating these fees into integrated contracts for brownfield redevelopment requires some creativity and examples from real life are yet missing. However, there are some experiences with integrated services by remediation contractors. The idea here is to let remediation be done by a remediation contractor at a fixed clean-up price, with guaranteed full indemnification for future liabilities, as remediation contractors are in the position to optimally assess risks and can apply innovative remediation methods.

Integrated contracts can be used to capture the uplift in economic values after redevelopment by means of the concession mechanism, if operating and maintenance contracts are to be newly procured or renegotiated after a certain period of time. More generally, not selling land right out but maintaining a ground rent (lease) based on a percentage of the let-able rent achieved by the developer, can be a tool to capture the uplift in land value after the initial phases of development.

JESSICA

The Bristol Accord of December 2005 established the principles of a common EU urban policy. European Parliament and other EU actors have repeatedly called for sustainable urban development to be included within the mainstream of cohesion policy and EU Structural and Cohesion Funds, rather than within the community initiative framework. In line with the objective of the re-launched Lisbon Strategy the European Commission has put forward its strategic approach for the next cohesion policy programming period 2007-13, of which JESSICA is part.

JESSICA is an optional facility for the programming period 2007-13 of the EU Structural Funds, involving the European Investment Bank (EIB) and the Council of Europe Development Bank (CEB). The EIB and –on a smaller scale- the CEB have been financing urban renewal and development projects for many years through targeted loan financing. The European Commission also has been involved in ur-

ban development through the community initiative URBAN II.

The objectives of JESSICA

JESSICA starts from a twofold presumption:

- there will be increasing investment needs for sustainable urban development, but available public funds are scarce, necessitating contributions by the public and banking sector;
- the administrative and technical capacity within urban authorities often does not match ambitions.

These two presumptions have resulted in two main objectives:

1. leveraging in additional resources that are suitable for PPPs and, in general, for urban renewal and development projects, without aggravating public finance and debt;
2. contributing financial, technical and managerial expertise from specialised institutions such as the EIB, the CEB and other International Financial Institutions (IFIs).

How does JESSICA work?

Under JESSICA grants from the Operational Programmes (OPs) may be transformed into (repayable) loan assistance. This transformation is done by contributions from OPs to either Urban Development Funds (UDFs) or Holding Funds (HFs). These contributions are eligible for ERDF interim payments. UDFs invest in PPP-projects aimed at urban renewal which are included in so-called Integrated Urban Development Plans (IUDPs). HFs invest in several UDFs. Apart from contributions from OPs, UDFs and HFs will also be funded by public authorities, the private sector and/or IFIs.

The idea is that the Managing Authorities (MAs), after publishing a call for expression of interest, evaluate and select UDFs or HFs. The EIB itself can be selected as a HF. After selection MAs negotiate and sign funding agreements. These agreements set out the conditions for loan assistance and the planning, monitoring and reporting requirements.

UDFs in their turn select specific urban development projects. In project selection and management UDFs can use the expertise of the EIB, CEB and other IFIs. These projects have to fall within the ERDF/CF scope of intervention and have to be part of an IUDP. Next to financial mechanisms supplied by the UDF (equity, guarantees and subordinated loans), it is possible that these projects receive grant support from OPs. OPs contributions that are repaid to the UDF must be reinvested into urban projects, if possible by the same UDF. The UDF thus functions as a revolving fund.

Assessment

It is clear that JESSICA primarily is a financing technique aimed at setting-up revolving loan funds (RLFs). From the perspective of brownfield regeneration the first relevant question than is whether JESSICA contributes to solving the market failures mentioned above: externalities and risk & uncertainty. The second question is whether JESSICA has additional merits or demerits.

JESSICA and market failures

RLFs have been put forward as one of the possible financing techniques for brownfield redevelopment projects. The main advantage of such RLFs is that "soft" loans can be issued, making it more attractive to private developers (or PPPs) to take on such projects. The advantage of RLFs by comparison with grant financing is that the investment character of such projects is made explicit. Furthermore, scarce resources can be re-used.

RLFs thus are able to deal with a specific type of externalities namely situations where private developers do not suffi-

ciently take into account social benefits of redevelopment and redevelopment does not take place on an appropriate level (from the perspective of society as a whole). RLFs are also able to deal with elements of risk & uncertainty by issuing subordinated loans and/or guarantees (venture capital). Such RLFs have for instance been established already in the UK (English Cities Fund, ECF) and in France (Caisse des Depôts).

However, what RLFs do not deal with is the possibility to internalize externalities in terms of future private benefits of redevelopment, as can be done by benefit-sharing- and claw-back arrangements and/or development charges. One could argue that JESSICA concentrates on one specific stage in the development process (financing in the restricted sense) and one specific type of project costs (costs of financing) but the facility does not necessarily lead to comprehensive cost-/benefit- and risk-sharing arrangements on a project basis. Other financial incentives and financing techniques may be just as significant as RLFs and should be used in combination with RLFs.

If the JESSICA system of UDFs and HFs really is indeed an optional facility only, there will not be a problem. However, because of scarcity of resources, it could well be that JESSICA's UDFs and HFs become the default way of handling the financial part of urban redevelopment, including brownfield regeneration.

Additional (de)merits of JESSICA

The second objective of JESSICA is to provide technical, financial and administrative expertise through the involvement of IFIs like the EIB and the CEB. Using such expertise and making better use of best practices et cetera obviously makes sense. Yet, with the JESSICA framework comes a whole set of –administrative- requirements, including the following:

-UDFs have to come up with a business plan specifying the target market, the operational budget, ownership structure, pay-back conditions, exit and winding-up provisions et cetera. These requirements are partly due to the fact that JESSICA is part of the structural measures (and grants are "transformed" into capital) rather than being a separate investment programme (within the EIB or within a newly established EU loan fund);

- the PPPs and other projects that are funded by UDFs have to be included in an integrated plan for –sustainable- urban development which deals with the physical and social aspects of redevelopment and with the issue of citizen participation. No guidelines for such plans exist at present, but they will be issued for sure;

- although the JESSICA programme is not yet specific on the legal form, PPPs that are to be funded by the UDFs have to be "independent legal entities".

MEPs have already expressed their concern about the complexity of the JESSICA instrument (REGI Committee Meeting, 22 November 2006, Brussels). The question then is: do we need JESSICA to enhance the use of technical and managerial expertise in the field of brownfield regeneration? Will it –for instance- still be possible to get EIB funding (and with that: EIB expertise) for regeneration projects without using the JESSICA facility? Behind these questions is a more fundamental one: why this complicated transformation of Structural Funds resources into loans rather than simply increasing the direct involvement of the EIB (the largest RLF in the world …) in urban development?

Conclusions

Two conclusions can be drawn. First, RLFs backed by IFIs like the EIB clearly enhance the financing potential for brownfield regeneration, but JESSICA (and its focus on such RLFs) is not necessarily adequate in establishing equitable and efficient cost/

benefit- and risk-sharing arrangements on the project level. Secondly, JESSICA probably overkills, in the sense that the JESSICA framework is quite complicated and could well become a straitjacket rather than a tailored suit.

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4.2 Developing a Model of Financing for Brownfield Redevelopment: How to Integrate Contamination Risks and Legal & Political Risks?

Lars Holstenkamp

ABSTRACT

The paper presents first results and ideas from an ongoing project dealing with the construction of a private closed-end fund for the municipal area of Hannover, Germany. It is argued that for assessing the economic prospects of the project it is helpful to apply a Monte Carlo (MC) simulation approach. Thereby, it is possible to account for contamination risks. Questions that must be solved are (1) to find probability distributions for the uncertain variables and the correlations among these, (2) to adequately integrate legal and political parameters.

Despite its merits with regard to accounting for contamination risks in investment appraisal a MC simulation may not be useful for every kind of risk. Integrating legal and political factors using a solely stochastic approach appears not to be convincing, since this kind of uncertainty results from the strategic interaction of agents. Therefore, the potential value of using game theory and institutional analysis is stressed.

Accounting for Uncertainties

A Multitude of Uncertainties

When assessing the economic prospects of a project and the capital budget needed for the project it is necessary to make a forecast for future cash flows. Thereby, one must deal with uncertainties encompassing projected variables and parameters. The level of uncertainty influences the decision not only of project managers, but also of other project participants such as potential lenders. This is obviously true for project finance where the loan is initially based on projected cash flows only – thus the great deal of attention paid to risk management measures (Nevitt & Fabozzi 2000: 1, 9-27).

The same applies for brownfield redevelopment projects which are characterized by complex contractual arrangements and a multitude of uncertainties. Many private investors are threatened by the multitude of uncertainties of remediation projects. Moreover, there is a lack of knowledge and information. If uncertainties are adequately modelled and managed, remediation projects may loose much of their threat. Thereby, it could be possible to convince other partners to join the project.

Besides, to model uncertainties in an adequate manner may help to prevent a disaster (liquidity planning), structure contracts and finance, and help to decide among alternative risk management measures and with portfolio choice.

The uncertainties must be identified and, if possible, quantified in order to be able to manage them. All uncertainties remaining with the project company must be taken into consideration for financial projections. Questions posed and to be answered by investment and financial

planning may include: Is the project economically viable? Does it pay for equity holders to invest in the project? How should the portfolio be composed so that it matches the requested risk-return profile? How much money is needed to remediate the site taking into account that normally there is only a more or less rough estimate of the quantity and quality of the contamination?

In order to be able to answer questions related to investment and financial decisions, it is therefore necessary to find adequate techniques to integrate uncertainties into appraisals.

Uncertainty, Risk, and Ambiguity

Uncertainty is defined here as a general category comprising risk and ambiguity. Risk denotes a negative or positive deviation from expected value with an objective or subjective probability assigned to the event causing the deviation, whereas in the case of ambiguity no such probability can be given. Note that risk therefore includes not only downside ("hazard" / "peril") but also upside risk ("chance").

Ambiguity and risk thus defined form ideal cases. Normally, people have at least a rough idea of the probability of an event leading to a deviation from expected value due to past experience, even if they cannot state explicitly a properly defined probability function (Laux 2003: 117). While not totally extinguishing the role for ambiguity in investment planning and although there may be other mathematical tools for modelling intermediate cases, it is the main justification for the use of subjective probabilities built upon expert opinion. It is this understanding of the term "risk" which underlies the following remarks.

Methods Usually Applied: Scenario and Sensitivity Analyses

A frequently used approach to integrate uncertainty into investment appraisal is scenario ("best, optimistic, pessimistic", BOP) and sensitivity ("what-if") analysis (for further details see Ross, Westerfield & Jaffe 2005: 214-219; Kruschwitz 2003: 314-319) which explore how sensitive a net present value (NPV) calculation is to changes in underlying assumptions. With BOP analysis usually three scenarios are set up: A pessimistic, the expected (or best), and an optimistic forecast of all cash flows. With sensitivity analysis one parameter is changed while controlling the parameters, and the effects on the NPV of the investment are examined. One can also determine critical values for the different parameters, i.e. investigate at which value of the parameter the NPV becomes 0. A special case is break-even analysis where unit sales are varied (Ross, Westerfield & Jaffe 2005: 216-219).

Although scenario and sensitivity analysis present valuable information with regard to the importance of assumptions made about certain parameters, there are a number of drawbacks (Ross, Westerfield & Jaffe 2005: 216; Savvides 1994: 1, 5; Blohm, Lüder & Schaefer 2006: 236f.):

1. Holding other parameters constant while changing the investigated parameter makes sense if, and only if the variables are not related (i.e. stochastically independent). But this is certainly not the case for many variables in real life projects.

2. Both techniques do not allow for conclusions about the probability of deviations from the expected NPV. Thus, risks are not fully considered in these kinds of investment appraisals. Moreover, no information is provided concerning expected value and variance (or standard deviation) of the whole investment. Therefore, sensitivity and scenario analysis are of little help for putting together the portfolio of a fund.

3. To set in the expected value for each parameter / variable will not necessarily yield the most likely result for the whole project. Thus, the "expected" scenario may mislead about

the most likely value for the decision criterion.

4. Most importantly: The selection of scenarios is quite arbitrary. And changes of parameters which have a huge impact on the decision criterion may still be quite unlikely.

Applied to remediation projects this means that although it is possible to identify whether changes in parameters used in a scenario such as the quantity and the quality of contamination are crucial to the investment decision, it is not possible to fully account for uncertainties underlying these parameters. Although a scenario analysis may yield clearly arranged results, additional information regarding the likelihood of the scenarios is needed in order to make thorough decisions.

Outline of the Paper

The rest of the paper is organized as follows: The first paragraph gives a short introduction to the research project out of which some preliminary results and ideas are presented in this paper. Moreover, uncertainties connected with the remediation of contaminated sites are grouped into six classes out of which two groups are extracted and discussed in detail in the following paragraphs: First, risks resulting from uncertainties about the quality and quantity of contaminations; second, risks emanating from the legal and political environment of the project. In the first case the idea of Monte Carlo (MC) simulations to account for this kind of uncertainties is promoted. Problems to be solved here are to select the right probability function and to correctly model the stochastic dependencies. With regard to the case of legal and political risks it is argued that a stochastic approach may be less convincing. Game theory together with institutional analysis may provide a way out of this problem.

Project Background

Private Fund Model for the City of Hannover

Ideas presented in this paper are part of an ongoing research program titled "Sustainable Land Management Hannover". The goal is to develop a private fund model to clean up and redevelop brownfields in the city of Hannover, thereby combining elements of closed-end funds, project finance, and public private partnership (PPP). For more details about the project, which is part of the REFINA program, see the description in this volume.

Uncertainties and their management play a central role in project finance as well as in PPP's. A better allocation of uncertainties is one of the rationales behind PPP's (Grimsey & Lewis 2004: 13). As will be shown below, this also applies for the private fund model which is to be developed within the project.

Risk analysis – comprising the identification, valuation and modeling of uncertainties – is a first step in the risk management process. It builds the basis for later stages such as the allocation and controlling of uncertainties (Wolf 2003: 48).

Uncertainties Associated with Remediation

Uncertainties associated with a contaminated land remediation project can be clustered into six classes:

- operational uncertainties,
- financial uncertainties,
- supply uncertainties,
- sales uncertainties,
- environmental and natural uncertainties,
- uncertainties stemming from the legal, political and social environment.

Two kinds of uncertainties are analysed in more detail in the following paragraphs: First, contamination risks – where "risk" denotes the assumption that one can assign a probability function to this group of uncertainties – and second, legal & political risks, where it may be even more difficult to make a statement on probability.

Contamination risks can be seen as a special case of environmental uncertainties. Although they are quite common with construction projects, the occurrence of contaminations is normally regarded as worst case. Naturally, this is different in the case of remediation projects. Thus, this kind of risk must be rated as one of the central categories of uncertainties.

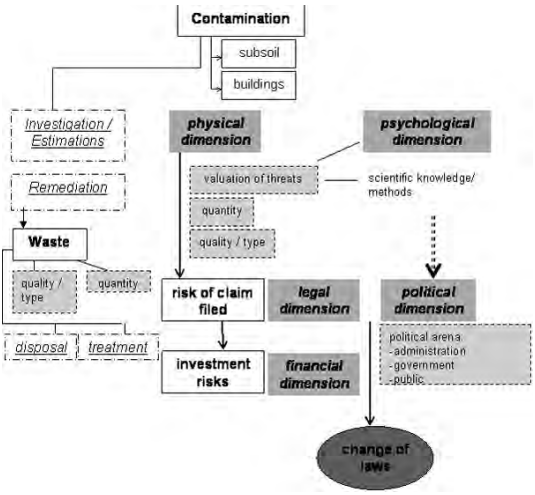

Figure 1:
Cash Flows and Project Specifications

Looking at it from different perspectives, at least five dimensions can be distinguished: The physical, psychological, legal, political, and the financial dimension, which are, of course, highly interrelated. In figure 1 it is shown that physically neither the quantity nor the quality or type of the contamination of subsoil as well as buildings are known with certainty. Moreover, the evaluation of the contamination from a scientific point of view, but also by political actors and the wider public (psychological dimension), is uncertain. Within the political arena laws are passed or changed (political dimension) determining the risk that a claim is filed (legal dimension), which causes investments to be made (financial dimension).

Remedial investigations are made in order to estimate quantity and type of the contamination of the site. Nevertheless, uncertainties remain, since the investigation may be deficient and even if this is not the case, it is never possible to project quantity and type with total certainty. Moreover, remedial actions may be inaccurate or insufficient, take more (or less) time than estimated, and may produce more or less waste whose type is not known beforehand with certainty.

Some of the legal & political factors influencing project outcomes are already mentioned above. Changes in laws, liability, and permissions needed to carry out the project are among the most prominent factors for the type of projects discussed here. As is analyzed in more detail below, risk management strategies include remedial contracts and other forms of public private cooperation. But if such an arrangement can be made with the responsible authority, the conditions and time frame are not known exactly beforehand.

As argued above, all of these risks must be adequately modelled in an investment appraisal. The first type of risks, uncertainties with regard to quantity and quality of contamination, can be mapped in a MC simulation.

Modeling Contamination Risks: MC Simulation

Basic Steps

A simulation approach to risk analysis has been proposed by Hertz as early as 1964. The main idea is to overlay the different risks and thereby generate an aggregate

probability distribution for the whole array of risks.

A MC simulation can be broken down into five stages (Ross, Westerfield & Jaffe 2005: 220-223; Savvides 1994: 3; Blohm, Lüder & Schaefer 2006: 245-253):

(1) Specify the Forecasting Model

A decision rule (e.g. NPV > 0) and therewith a basic model is selected. All input variables determining the key figure are identified and the relationship between input variables and key figure are specified in functional form.

(2) Specify the Probability Distributions

A probability distribution is assigned to each uncertain input variable (e.g. normal, uniform, or triangular distribution). Two sources of information are possible: First, one can analyze historical data and use statistical methods (e.g. regression analysis). Using these kind of "objective" probabilities implies that the project investigated is comparable to those projects evaluated statistically. For unique projects and events, no objective probabilities exist. Second, one can assign subjective probabilities to the events causing the risks. To use expert opinion is an often applied approach.

(3) Specify the Dependencies Among Variables

Besides the probability distributions, one must also specify the dependencies which exist among the uncertain variables. Here, the same methods as under (2) can be applied. Correlation coefficients are commonly used to express the stochastic dependencies. But one can also use conditional probabilities.

(4) Run the Simulation

After having set up the model, probability distributions and dependencies among the variables, random numbers for the uncertain variables are computationally generated which comply with the conditions specified under (2) and (3). The result of one simulation is one value for the key figure. By repeating the simulation several times, a probability distribution for the key figure is generated.

(5) Interpret the Results

The last step is the interpretation of the results which depends on the information needed to make a decision. MC simulations are only an auxiliary tool for decision making. They do not include in itself decision criteria, but provide information for a given decision criterion. One can for example calculate the probability of making a loss or use expected value and standard deviation / variance of the aggregated distribution for decision making.

Not only can cash flows of a single project be simulated. It is also possible to run a MC simulation for a portfolio of several investments (Blohm, Lüder & Schaefer 2006: 315-317).

Cash-Flow Model – A Very Simple Example

In the following a very simple example of a MC simulation for a remediation project is given (for an example see also Jansen 2006). We assume that an investigation of

Table 1 Cash Flows and Project Specifications

Cash Flow	Calculation	Values	Year (t)
Expenditures for property	fixed price (p1)	p1 = 50,000 Euro	t = 0
Soil remedial actions	cubature (qi) x costs per m^3 (ci)	c1 = 25 Euro/ m^3 c2 = 40 Euro/ m^3	t = 1
Disposal	volume (vi) x costs per m^3 (di)	v1 = ¼ q1 v2 = ¾ q2 d1 = 50 Euro/ m^3 d2 = 100 Euro/ m^3	t = 1
Sales revenues	fixed price (p2) [depending on kind of contamination found on the site]	p2 = 200,000 Euro if q2 = 0 and p2 = 150,000 Euro if q2 > 0	t = 2

the site has been made, that no groundwater treatment is necessary, and that the projected duration of the remedial action is one year. The following specifications are made:

1. The investment concept applied here is NPV. Future cash flows are discounted with a rate of 8% per year. The formula for NPV can be given as follows:

$$NPV = \sum_{t=0}^{m} \frac{E_t(X)}{(1+p)^t}$$

with t: year; m: time frame; CF_t: cash flows in year t; p: discount rate; X: vector of uncertain variables.

Quantity and type of contamination are the uncertain variables in this simple example. One could add further uncertain variables which would make the model more complex. We will stay with only these two here. Both together determine the costs of soil remedial actions and waste disposal.

2. Contamination types are classified into two classes. The cubature to be excavated (quantity q_1 of class 1) is normally distributed. The probability that another type of contamination (class 2) is found on the site is 10% with a uniform distribution function for the quantity q_2 (see table 2).

3. Quantity and quality of contamination are statistically independent.

4. Running the simulation 1000 times results in the two probability functions for the project NPV as shown in figure 2.

5. The last step is to interpret the result. Having run the simulation 1000 times yielded a mean of 21,547.50 Euro, a standard deviation of 51,369.61 Euro, and a relative frequency of loss of 0.112, i.e. 11.2%. Constructed in this way the project therefore leads to a positive NPV in almost 90% of the cases. Neverthe-

Table 2:
Uncertain Variables: Probability Distributions

Variable	Type of Probability Distribution	Specifications
q1	normal distribution	μ= 2,500 m³ S =500 m³
q2	uniform distribution	100 m³ < q2 < 2000 m³

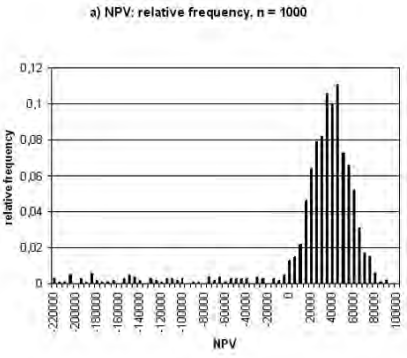

Figure 2:
Uncertain Variables: Probability Distributions

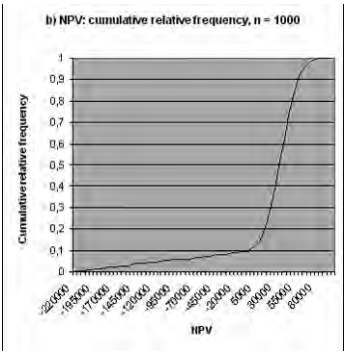

Figure 3: Upper and lower range limit for deviations of contamination costs according to Kerth / van de Griendt (2000)

less, it is quite risky and whether one should start the project depends on the risk taking preference of the decision maker.

Questions to be Solved

Expert Opinion and Subjective Probability

There are a number of reservations against the utilization of subjective probabilities which are central to a MC simulation as described above. But at least three arguments can be made for subject probabilities: First, the information needed to run a MC simulation must be given anyway, e.g. if one is trying to assign a probability to a certain scenario – which is always subjective, but nevertheless needed to make a thorough appraisal. Moreover, explicitly documenting all information required by a simulation helps to structure the decision making process and to make it more transparent. (Maybe, the latter is the reason for some reservations.) Second, a number of mathematical enhancements exist which can account for informational problems (see e.g. Wiesmann 2003). Third, those deterministic methods applied in many remediation projects can be seen as a special case with assigning all probability to a single value (Savvides 1994: 9). Thus, not all information available is actually used.

The major source of information in a remediation project is the evaluator who makes the remedial investigations. In order to run a MC simulation for the project, probability distributions and dependencies must be derived from information given in the investigation report. Moreover, it is possible to consult other experts. Both remedial investigation and expert interviews are not for free. Therefore, it is necessary to weigh the further information gained through deeper investigation and surveys on the one hand and the costs associated with it on the other hand. Providing some information which can be used for remediation projects in general is one goal of a workshop which will be held in May this year in Hannover.

Historical Data

Besides using subjective probabilities via questioning brownfield experts one could also try to collect and analyze historical data. This approach has been taken by Kerth & van de Griendt (2000) for a similar exercise. Evaluating Dutch data, they explored the positive and negative deviations of remedial costs in relation to projected total costs over a confidence interval of 80% depending on the level of examination of the site. Resulting deviation factors are given in table 3.

Table 3
Upper and lower range limit for deviations of contamination costs according to Kerth / van de Griendt (2000)

Level of Examination	Lower Range Limit Deviation Factor	Upper Range Limit Deviation Factor
no investigation	0.10	2.80
historical investigation	0.20	2.60
orientational investigation	0,50	2,00
detailed investigation	0,70	1,60
remedial investigation	0,80	1,40
remedial plan	0,85	1,30
remediation executed	1,00	1,00

Thus, Kerth & van de Griendt provide necessary data for a scenario analysis: The lower range limit as basis for the best case scenario and the upper range limit as basis for the worst case scenario. For a MC simulation further assumptions regarding the distribution of costs within this interval must be made.

Moreover, one must ask if results for the Netherlands can be generalized and if there are other, maybe even more meaningful factors influencing positive and negative deviations of remedial costs (i.e. the former utilization of the site, regional peculiarities, type of project company). Without generalized information for a

wide range of projects and a thorough statistical analysis of datasets one can only resort to information given by the respective evaluator – an approach taken for example by the developers of the computer tool Re-Move! (Jansen 2006).

It is quite intuitive that with the rising level of an examination the deviations of real costs after remediation from expected costs diminish. Thus, with all other factors held constant and data such as that provided by Kerth & van de Griendt it should be possible to deduct an optimal degree of examination:

$$NPV = f(l_E, \overline{Y}) \rightarrow \max!$$

with l_E :level of examination; $\overline{Y}$: other factors influencing NPV and held constant.

Similar exercises could be undertaken for other factors, thereby optimizing costs for examination and planning.

Dependency Among Risks

With regard to dependencies among different uncertain variables a similar approach can be applied as with probability distributions. But at least two drawbacks must be mentioned:

1. It is rather difficult, even for experts, to clearly state a value for the correlation coefficient of two variables. That is why often only two extremes are considered: Either a correlation coefficient of 0 (no dependency) or a coefficient of 1 (full dependency) (Blohm, Lüder & Schaefer 2006: 249).

2. If not all interactions among variables are accurately represented, the result may be seriously flawed (Ross, Westerfield & Jaffe 2005: 223).

Nevertheless, using correlation coefficients may suffice as first approximation, although more sophisticated methods may be needed to better cover underlying dependencies.

Integrating Legal and Political Factors

Nature of the Risks & Risk Management Strategies

It has been shown that in principle contamination risks can be modelled with stochastic simulation techniques. The same does not apply to legal and political factors – as will be argued in this paragraph –, which can become quite important for success or ruin of a project. Three aspects will be looked at in more detail in the following: Liability & private public cooperation, permissions risks, and changes in laws.

The importance of the first point is quite intuitive: The owner of the site is held liable for any contamination and must therefore raise all funds needed to clean up the property. Remedial action measures and cleanup target values must be negotiated with the authority. It must be the aim of the private investor to be exempted after successful implementation of the measures. Remedial contracts ("Sanierungsverträge") according to § 14 III BBodSchG (German soil protection law) are an instrument which allow for this. Nevertheless, it is not sure if the authorities are willing to include exemption clauses in these contracts. Since this a behavioral rather than an event risk, it must be asked how it can be adequately modelled in a stochastic environment.

The second issue which is of great relevance to remediation projects are permissions under building law, which are needed for the utilization of the site after successful cleanup. Since land-use plans are signed by communal councils under German law, an analysis of the political arena (e.g. political constellations, veto players, lobbies and the role of public opinion) is

needed to get more information about the nature and extend of this risk, which is again of the behavioral type.

Remedial contracts can be seen as a kind of contractual PPP and a potentially valuable strategy to manage liability risks. To cooperate more closely with the responsible authorities and maybe even integrate them into the project company, could be a risk management measure for permission risks.

Changes in laws, the third issue mentioned, may have an effect on remediation projects especially if they concern liability rules and target values within soil protection laws. It is most likely that these rules will become stricter in future. Nevertheless, it is useful for financial projections to analyze causes and effects of possible scenarios in more detail.

Modeling Techniques

But how include these risks in the overall simulation model? In principal, it would be possible to run MC simulations for different scenarios. If one assigns a probability to each scenario, it would even be possible to calculate key figures over all scenarios, which leaves us with at least one remaining problem, namely the determination of the likelihood of different events. Moreover, one can ask if concepts exist which can better account for legal & political factors.

Two ideas will be outlined here very briefly: First, problems associated with different kinds of contracts – and thus also PPP contracts – can be analyzed in the framework of transaction cost economics and contract theory (Roggencamp 1999: 192-195). Thereby, it is possible to work out appropriate strategies to manage problems resulting from incomplete contracts and asymmetrical information such as "hold up", "adverse selection", and "moral hazard". These theoretical devices therefore help to design PPP contracts and assess the likelihood of deviant behavior.

Second, game theory may provide a useful framework for the analysis of political constellations. Besides, it is widely applied within contract theory. Game theoretic modules can be easily integrated into a simulation model (Dai, Wu & Ni 2000). Information must be given about relevant players, their strategies, rules of the game and information sets of the players (Hart 1992). Applications to PPP already exist (see e.g. Roggencamp 1999) and the results could be used for remediation projects as well.

Since signing of laws is done in the political arena, the same as has been said in the paragraph before applies to potential changes in laws. Nevertheless, a thorough analysis of all elements of a game as mentioned above requires a whole set of information which is not easily accessible to practitioners in the field of brownfield redevelopment.

Conclusions

Contamination risks as well as legal & political risks are central to investment appraisals in remediation projects. While the former can be adequately modeled in a stochastic environment via MC simulation, the latter require other concepts to be applied. Game theory and institutional economics may provide useful frameworks. Nevertheless, high informational requirements and the need for detailed analyses may deter project managers from applying these concepts in remediation projects. As with regard to the specification of probability functions and dependencies among risks there is a need for further studies and more generalized information which can be fed into computer simulation tools.

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4.3 A Revolving Fund for Brownfield development

Reinier M. Besemer

ABSTRACT

Dutch spatial planning is changing. Revitalization and large-scale restructuring of industrial and old residential areas are becoming increasingly common. Urban redevelopment can, however, be hampered by the presence of brownfields. Financial risks posed by expenses such as soil remediation costs, are a particular hindrance. Since most investors are reluctant to take risks, they will be inclined to invest in low risk 'greenfield' sites instead.

The project ‚Brownfields Better Used' ('Brownfields Beter Benut')[1] focuses on this redevelopment issue. It proposes a plan in which the development of financial incentives serves to encourage soil remediation as part of the brownfield redevelopment process. These incentives are based on the spreading of financial risks. One of the promising tools analysed in the study is a revolving fund for brownfield redevelopment, which comprises finance and insurance components. According to the researchers, it would be an important addition to the current financial toolbox for brownfield development in the Netherlands.

1 The project 'Brownfields Better Used' is a joint initiative of a partnership comprising ABL2, ATM Moerdijk, Boer & Croon Ruimtelijke Investeringen, Bouwfonds Fondsenbeheer, Dura Vermeer Business Development, Engineering Department of Public Works Rotterdam and TAUW. It is co-financed by the Dutch Centre for Soil Quality Management and Knowledge Transfer ('SKB') and supported by the Dutch Ministry of Housing, Spatial Development and the Environment ('VROM').

Introduction

What is the need for a study on a revolving fund for brownfield redevelopment?

Contaminated inner city sites often remain underused, even though features like their location would, in theory, make them highly suitable for redevelopment. These sites, or 'brownfields', are a major impediment to urban regeneration.

Redevelopment is encouraged by several social approaches. After all, vacant or derelict sites lead to urban deterioration and do nothing to contribute to strong, vibrant cities. This problem is also described in the Spatial Policy Document ('Nota Ruimte') of the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM). The Document endorses that development of these sites can provide a positive impetus to the quantitative house-building programme.

The objective of the 'Brownfields Better Used' ('Brownfields Beter Benut') project is to encourage brownfield redevelopment in the Netherlands. The project's main focus is the development of financial tools that help promote regeneration. With regard to the existing toolbox, improvements could be made to increase both the speed of redevelopment and the number of sites that can be regenerated.

Brownfield Definition

A number of different brownfield definitions are in use. The brownfield sites this project focuses on are Dutch sites where, even though they do have redevelopment potential, redevelopment has not taken place or is extremely difficult. The main characteristics of Dutch brownfields are:

1. They are inner-city sites:
   - That are underused;
   - With an industrial history dates back to well before the year 1975;
   - Whose soil is usually contaminated;
   - That have regeneration potential;
   - With complex and fragmented ownership patterns.
2. Government intends to redevelop the site.
3. Soil contamination poses a financial risk.
4. Function-oriented remediation would be possible.

Foreign experiences

What can be learned from foreign projects? Some examples.

REGENTIF (EU 5th FP)

A survey of 26 extensive sites that have been redeveloped throughout Europe shows that most of these redevelopment projects were funded through public-private partnerships. The financing of these sites did, however, rely heavily on public funds, as it proved difficult to attract private partners and funds. This can be partially explained by the lack of an integrated approach during the preparation stage and beginning of redevelopment projects. Additionally, the survey indicates that these PPP's are most successful when the different stages of a redevelopment project are funded by one financing package. Such an integrated financial approach spreads and decreases financial risks and makes brownfield redevelopment more attractive to private investors.

CABERNET (EU 5th FP)

CABERNET also analysed the issues concerning redevelopment, and endorses the importance of a multi-stakeholder approach to brownfield regeneration. The scope of the analysis was not limited to environmental aspects and the socio-cultural dimension of redevelopment, but included a review of economic opportunities and threats as well. Although it is hard to make general claims about specific financial aspects concerning European brownfields, the (high) cost of soil remediation is regarded as a major financial impediment in many countries. Particularly interesting in this respect is that other sources demonstrate that soil remediation costs amount to 5 to 10 percent of brownfield redevelopment costs. In addition to the issues mentioned above, CABERNET also focused on financial tools. Several countries administer grant schemes for brownfield redevelopment, with most of these schemes being administered when soil contamination is encountered. No extensive evaluation of these schemes is provided, however. Revolving funds in countries outside Great-Britain are not explicitly mentioned.

EPA Brownfields Revolving Loan Fund (BRLF)

Developers in the United States can apply for a revolving fund known as the EPA Brownfields Revolving Loan Fund (BRLF). It was established in 1997 and has been granted about 190 times. Federal government grants in the form of such a loan fund enable recipients (state, municipality and other government-related bodies) to finance the remediation activities of a redevelopment project. Grants have

a performance period of up to five years and cannot exceed $1,000,000 per BRLF. The recipient has to use at least 60 percent of the awarded funds to implement a revolving loan fund, which is used to provide no-interest or low-interest loans for brownfield cleanups.

The recipient should also participate in a cost share programme, in which he or she is required to contribute 20 percent of the BRLF funding in the form of money, labour, services, material, etc. For the United States situation, the EPA states that average soil remediation costs amount to 7 percent of total remediated brownfield redevelopment costs.

Scope of the issue

At the moment, no unequivocal view of Dutch brownfields exists. Towards the end of the year 2006, a survey based on a number of existing databases provided some insight into the scope (costs, number, and size), characteristics (nature and origin of contamination) and different geographic locations of contaminated sites in the Netherlands. Unfortunately, no data is available on underutilization, vacancy and lack of (re)development of land. Therefore, it remains unclear how much of the data in the table below can be ascribed to sites that, according to the brownfield definition mentioned earlier, are considered brownfields.

The table below provides a summary of this survey:

Applicability of existing toolbox

Within Dutch policy framework, encouragement of Brownfield redevelopment utilizes a two-pronged approach, with on the one hand general regulations and forms of collaboration that can be applied to brownfield redevelopment, and on the other hand specific incentive legislation that may be (partially) applicable to brownfield regeneration.

In the current study, the possibilities and limitations of these diverse approaches are analysed with regard to their applicability to brownfield regeneration. Considering the increasing demand for both houses and industrial estates, optimization of redevelopment and prevention of long-term under-use of brownfield sites are becoming more and more necessary. The existing set of tools, however, is insufficient to

Number	Number of locations (rounded) that meet the criteria/preconditions described above	Current surface area (ha)	Number of expected remediation projects	Expected costs x 1,000,000	Expected remediation area (ha)
Current industrial estates	13,000	18,500	2,400	615 Euro	3,600
Current solitary company premises	12,000	9,500	2,200	520 Euro	1,750
Former gasworks	100	200	50	60 Euro	90
Large-scale activities	4,200	6,000	710	255 Euro	1,000
Total	29,300	34,200	5,360	1,450 Euro	6,440

Some important comments on this table:

It is to be expected that the categories 'current solitary company premises' and 'current industrial estates' will account for most brownfield sites

The estimates are based on extrapolations of a relatively small amount (ca. 15 percent) of the total number of possibly contaminated sites where soil assessment has taken place.

implement these actions. A revolving fund could bridge this crucial gap between the current and desired situation.

Alternatives

As mentioned previously, a substantial number of tools do not pertain specifically to brownfield projects. Consequently, a new specialised tool should be developed that is an addition to the current toolbox. Since it would take the form of a public-private construction, a separate implementation body and budget as well as separate criteria are needed for this tool.

When a brownfield project initiator is in the position to employ one of the existing tools, he or she is free to do so. Another option could be to draw on a revolving fund to supplement insufficient funds from currently existing tools.

At the moment, a substantial amount of brownfield sites are not redeveloped because of the high risks and costs involved in regeneration, and insufficient incentives. This indicates that a new tool should be innovative, in that there would be no link between new developers and pre-existing contamination of the site (liability), and that a new partnership programme should be developed to enable participation of all parties concerned. Possible incentives include:

1. Guarantee fund: a fund which acts as a surety to financiers in case a developer should prove unable to meet his or her obligations. As a result of this surety bond, banks will be inclined to lend more funds at lower interest rates, since this poses less of a risk. The European Agricultural Guidance and Guarantee Fund (EAGGF) is an example of this type of fund.

2. Insurance programme: developers benefit from a level of security with regard to site exploitation. An insurance programme provides security by protecting against cost overruns. The developer initiating regeneration pays a premium into a fund, by which he or she is safeguarded against unforeseen risks. Examples of remediation programmes with an insurance component are GRIP (Arcadis) and the programme offered by the Dutch Soil Centre ('Bodemcentrum').

3. Revolving fund: developers initiating redevelopment can obtain low-interest loans (with, for instance, an interest rate no less than 1.5 percent and no greater than 5 percent below the current market rate) from this fund. Redemption and interest flow back into the fund, and can be utilized to cover residual risks and institutional controls after remediation is completed. The National Restoration Fund ('Nationaal Restauratie Fonds') is a Dutch revolving fund that provides low-interest loans to owners of listed monumental buildings.

Given that a balanced budget is a prerequisite for developers initiating brownfield regeneration, a combination of an insurance programme and revolving fund appears most useful, since it provides funds as well as risk coverage.

Developing a revolving fund

Preconditions

To enable further development of the revolving fund, a number of preconditions are determined:

1. Financial risks should not only apply to contamination of the soil, but to archaeology and subterranean objects as well.

2. The size of the funds should be sufficient to meet the fund's financing requirements.

3. The fund is required to function as a long-term bridging loan. Brownfield development often takes place in stages. Normally, different parts of the site become available for development at different times, since buying out property owners and waiting for companies to move to another location takes time and does not happen at once. In reality, the full amount of a long-term loan is never granted all at once, as that would pose too much of a financial risk to the finance company.

4. Revolving funds should offer 'cheap money,' since they are established to fund problems encountered in brownfield site soil, which is like a black box. Brownfield sites, therefore, can hardly be quantified in euros when redevelopment has not yet taken place.

5. The organization of the fund should be simple and uncomplicated.

6. The fund is required to offer a solution for residual risks (residual contamination). Open-ended regeneration of brownfield sites is in no party's interest. When developing a solution to this problem, the possibility of liability transfer should be taken into account as well.

7. Responsibilities of both public and private parties should be unambiguously defined.

Target groups

Parties that have an interest (economic, environmental, reputational, legal or social) in brownfield redevelopment are:

- The owner of the site: returns on contaminated sites are limited and even frequently insufficient to meet remediation costs;

- Initiators (developers and builders and municipalities involved in redevelopment): initiators are mostly developers/builders that may have formed partnerships with municipalities and in whose interest it is to develop a site into economically viable properties. To enable regeneration, risk management tools are needed as well;

- Governments (the competent authorities with regard to spatial planning and environment): local and national government have an interest in redevelopment, since it has a positive effect on spatial planning and the environment. It is particularly relevant for municipalities, since remediation timeframes can be reduced when private parties get involved in tackling brownfield sites.

- The business community: numerous current businesses are directly or indirectly affected by brownfield sites and have taken part in the brownfield debate that has been going on for years. The desire for liability relief may offer the business community an extra opportunity to move forward and demonstrate its social responsibility.

All of these parties would profit from breaking the impasse in the redevelopment process, as the consequent benefits would be:

Economic: redevelopment of remediated sites would generate direct revenue for **owners** and **developers**.

Social/spatial: brownfield sites are often located in urban areas, which provide great opportunities for regeneration. Since land is becoming increasingly scarce and should be utilized accordingly, **govern-**

ments would welcome redevelopment of urban brownfield sites. Because of high demand for new high-quality houses in built-up areas, these sites would be attractive to **developers** as well. Besides, redevelopment of urban sites usually has a positive effect on their surroundings as well.

Environmental: due to contamination, many sites represent an environmental hazard. Because it is in the public interest, **governments** have the main responsibility to reduce this environmental risk.

Reputational: reputational benefits are particularly important to the business community. Even though the **business community** is not necessarily legally responsible, it is often blamed for contamination of brownfield sites, which has impacted its reputation. Current **brownfield site owners** would also improve their image when their properties are remediated.

All parties are regarded as prospective revolving fund recipients, as they would all benefit from redevelopment.

Working of the fund

Finance and insurance components

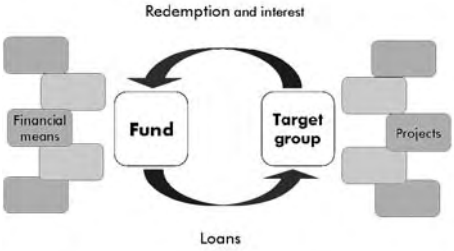
A revolving fund should provide two products: i) funds with appropriate funding provisions; and ii) an insurance programme that reduces risks to a level acceptable to stakeholders. Both products are described more extensively below.

i) Funds with appropriate funding provisions

Funds become available through a revolving fund. This means that money, in the form of loans, is initially taken out of this fund, but will at a later stage flow back into the fund by means of interest and redemption fees, after which it either becomes available to cover residual risks, or can be utilized to fund another redevelopment project. A single euro will therefore contribute to a number of successive projects, which makes the revolving fund a permanent source of funding.

The working of a revolving fund can be visualized by means of a flow chart:

Because of the nature of revolving funds, the number of times a single euro can



be utilized to fund other projects is determined by the terms of the individual loans. The number indicating how many times a single euro can be supplied is called ‚multiplier'. The shorter the term of the loan, the larger the multiplier and the more effective the capital.

In the case of a brownfield redevelopment loan fund, terms will be equal to the duration of redevelopment, starting with environmental site assessment and ending once the redeveloped site pays for itself. Since site assessment is the first financial hurdle in brownfield redevelopment, its costs should be covered by the loan as well.

Remediation costs and their associated risks and insecurities are significant impediments to brownfield redevelopment, which is why low-interest rates are crucial for developers.

The exact nature of the loan will have to be customized for all individual projects. Refinancing is one of the possibilities available for funding redevelopment, and is particularly useful in respect to environmental site assessment costs. Once the assessment has been completed, the extent, nature and costs of the appropriate remediation process become apparent and a remediation funding requirement

can be established. Site assessment costs, however, will have to be refinanced by this remediation loan as well, because at this point the initiator will lack the liquid assets needed to redeem the site assessment loan that was granted previously. A separate arrangement should be made for cases in which initiators decide to discontinue redevelopment after site assessment has taken place. In cases like this, the site will not be remediated and redeveloped, which means that refinancing is not an option. Therefore, contribution from the fund is advisable. A possibility would be for the revolving fund to account for half of the costs, under the condition that the fund and/or the competent authority acquire the assessment report.

ii) Risk insurance

When no remediation has yet taken place, knowledge concerning the extent and nature of soil contamination is limited. Therefore, quite a number of risks are involved in the remediation process. These risks, such as exceeding the allotted time and/or budget and not realising the project objectives are an important hindrance to tackling soil remediation and especially to remediation in relation to brownfield redevelopment projects.

However, after implementation of the revised Dutch Soil Protection Act ('Wet Bodembescherming') in 2006, function-oriented remediation of soil contamination has become sufficient, which brings about a substantial reduction in costs. But even though some residual contamination is now permitted, the brownfield sites do need after-care. Moreover, residual contamination poses yet another risk, because contaminants could, for example, spread to the aquifer. If that were to happen, appropriate measures would need to be taken to deal with the situation.

The revolving fund should provide solutions to the funding and insurance issues mentioned above. Insurance could diminish both the risk of exceeding the allotted costs during the remediation process and the residual risk once remediation is completed. Further analysis should determine whether it is best to create an insurance construction within the fund itself, or to form a partnership with parties that already offer such a product. In both cases, part of the revolving fund's capital could be utilized to provide an amount of money that is an acceptable share of the premium owed by the initiator.

During the planning stage, it is extremely important to accurately and systematically analyse what the actual remediation costs will be and what the unexpected risks will account for. Only then will it be possible to determine the risk insured, since this can only comprise of unforeseen risks. There are a number of risk assessment tools available that can be helpful when determining and managing risks. Such a risk analysis should be a requisite in order for a project to be accepted by the fund's insurance programme and should be compulsory when applying for a loan as well.

The Procedure

The implementation process of the revolving fund can be divided into two stages:

- Stage 1: inception of environmental site assessment until the remediation evaluation has been approved. During this stage, the fund provides loans to enable site assessment and remediation, and can provide insurance to cover the risk of exceeding

cost allotment;

- Stage 2: after-care. In this stage, the revolving fund provides funds for site after-care redemption and can offer residual risk insurance.

Stage 1 is concerned with the actual remediation process. The fund's involvement starts with the initiator's application for environmental site assessment. Along with this application, a plan should be provided, containing an outline of the integrated redevelopment approach as well as both spatial and environmental protection components. Once site assessment has been completed, the integrated plan can be finalized and risk analysis can be carried out. A remediation funding application can be submitted once the final version of the plan, comprised of a remediation plan (for which a preliminary permit has been granted) and a risk analysis, are drawn up.

Stage 2 focuses primarily on groundwater quality control. The initiator passes the site's after-care on to an existing after-care organisation. The costs of this transfer can be obtained from the fund. When the risk analysis states that the residual risks are insurable, the initiator can insure the site's residual risk through the fund as well.

Redemption of remediation loans and surrender of after-care can only begin once the site begins to pay for itself. Therefore, stages 1 and 2 show some overlap. Stage 1 ends when the costs have been recovered (or the moment the site is sold) and redemption of the loan is initiated. Prior to the end of stage 1 and the beginning of redemption, stage 2 has already come into effect and continues for as long as there is a need for residual risk insurance. The fund will not, however, be involved in this brownfield site forever. If desired, the fund could opt to resell the site's risks on the (international) market. Once the redeveloped site is sold, funding of the surrender of after-care is redeemed as well.

Acquiring funds

The revolving loan fund will be funded by public resources. Specifics will be determined in consultation with the Dutch Ministry of Housing, Spatial Planning and the Environment.

Size of the fund

The size of the fund will be determined by:

1. The number of remediation projects (sites that are in need of remediation and meet the criteria).
2. The time frame in which remediation projects should be completed;
3. The term of revolving fund loans (the longer the terms are, the more capital is needed);
4. The risks insured.

During the revolving fund's initial period, refinancing enables more funds to be supplied in the form of loans than have been deposited by the different parties.

Organization and control

After the specifics regarding the working of the fund have been determined, the legal part of the revolving fund can be developed in consultation with parties like the Dutch ministry of Housing, Spatial Planning and the Environment. The coordinating organisation providing the loans could take the form of a non-profit organisation with an independent board of directors, a supervisory board, and an executive committee with an executive director.

Conclusions

When a revolving fund is established it will improve both the quantity and duration of brownfield redevelopment. These benefits result from the very nature of the fund:

- It offers financial support for environmental site assessment, which provides insight into remediation issues.
- Its main objective is brownfield redevelopment, which it encourages by providing stakeholders with funds during the redevelopment process.
- It offers an economically appealing product with regard to its costs and terms and conditions.
- It provides redemption of surrender, possible residual risks and aftercare.

It offers useful insurance products to cover risks concerned with both remediation and residual contamination.

In addition, the revolving fund bridges some of the gaps involved in brownfield redevelopment that were analysed previously in this study:

- Economic and regulatory

  The fund focuses specifically on the redevelopment process and its broad definition of redevelopment makes it widely applicable.

- Liability

  The fund provides funding and insurance tools for dealing with residual contamination and residual risks, and integrates remediation and institutional controls.

All of these aspects show that a revolving fund would be an important addition to the existing brownfield development toolbox.

Follow-up

Even though a revolving fund would offer solutions to a wide variety of problems, it has to be acknowledged that it would not provide a solution for every impediment. The existence of a revolving fund would not change the need for long-term public support, and since this support can be difficult to obtain, it should remain a consideration throughout the redevelopment process. The fund itself poses some questions as well, which include:

- What will be the practical implications of issues regarding state-aid and how will they affect the working and appeal of the fund?
- Who will finance the fund and what implications will this have for the working of the fund?
- What will be the practical implications of the broad definition of the fund's target group and objective, and how will this affect the size of the funds?
- Which forms of organisation and organizational structure will be best to meet the fund's objectives?

As a follow-up to the current study, a number of case studies will be conducted. Case studies are a good way to test and analyse whether and how a financing tool will work in real life situations, and whether the tool truly contributes to improvement of brownfield redevelopment.

After analysing these real-life cases, the study intents to propose a generic description of a brownfield redevelopment financing tool. This tool should:

- be applicable to real-life situations;
- have an effect that can be directly attributed to the very nature of the tool;
- fill a gap in the current toolbox;

- be examined and approved for compatibility with current laws and regulations;
- be welcomed by stakeholders.

The results of this follow-up study are expected to become available in the course of 2007.

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4.4 Brownfields redevelopment by combining bitter and sweet

Matthijs H. Nijboer, Reinier M. Besemer, Martine Dielhof, Diederik van Hoogstraten, Armand Orbons, Hetty X. van Rhijn-Stumphius Wim Roozenboom

ABSTRACT

Trends in urban planning practise and a change of the legislation concerning spatial planning and soil quality, require new financial instruments to stimulate redevelopment of brownfield sites. One of these instruments, bearing the name Red for Grey, focuses on integrated development of brown- and greenfields. The hypothesis underlying this instrument is that there are possibilities for transferring money from commercially viable sites to marginally viable brownfield. The benefits of such an approach would be:

1. **Stimulation of coordination between different spatial developments;**
2. **Prevention of cherry picking, and;**
3. **More attractive tender for developers by combining sites of different financial risks.**

Three scenarios seem to be giving a financial stimulant in cohesion with a spatial planning strategy for the redevelopment brownfields. Nevertheless, several uncertainties need be challenged before implementation can commence. Momentary case studies are undertaken and additional studies have started to get more insight in the practical use of the instrument.

Introduction

Integrated urban land management is one of the key factors for the redevelopment of brownfields. This remark seems to be unnecessary in a densely populated country like the Netherlands with a strong planning tradition. Two new trends however have to be dealt with:

1. Shift from a strong public-oriented planning system to a stakeholder-oriented system;
2. Increase of land ownership by project developers in new urban areas.

Problem definition and hypothesis Introduction

In phase 1 of the Brownfields Improved Use project, it is concluded that the present instruments fail to commence redevelopment of brownfield sites. Besides insufficiencies regarding responsibilities, spatial planning and legislation, lack of sufficient financial resources forms the main shortage of the current tools. Redevelopment of brownfields is simply unremunerative. The "Brownfields Improved Use" project has investigated the possibilities of the Red for Grey concept for brownfield development.

In former times the local government was able to fund redevelopment of unprofitable locations by using the gains of moneymaking developments. This has become less easy since the number publicly owned profitable development sites decreases in favour of private developers. In this respect, new financial instruments for stimulating coordination between different spatial developments need to be worked out. One of these instruments focuses on integrated development of brown- and greenfield sites. In this concept, profitable urban developments are

used for funding the redevelopment of unprofitable (brownfield) sites.

Three scenarios

Hereafter, three scenarios based on land ownership at both sites will be worked out.

1. Combined brownfield (unprofitable) and greenfield development (profitable);
2. Stimulating brownfield developments by giving development rights of a viable site to the developer of a brownfield site;
3. Squaring accounts between brown- and greenfield sites by creating a brownfield redevelopment fund for specified sites.

The Red for Grey concept

The hypothesis behind the Red for Grey concept is that it provides new possibilities to balance costs in favour of brownfield sites. These possibilities have been reinforced by the new Land Policy Act in the Netherlands. The Red for Grey idea finds its origin in another squaring accounts concept, named Red for Green and which starts from the desire to find alternative ways of financing countryside and nature development and maintenance. It often combines public and private initiatives. Profitable (red) developments are used to finance unprofitable (green) investments.

In practise, conflicting interests between different public bodies complicate the implantation of the Red for Green concept. Unprofitable green and blue developments are the concerns of provinces and Water Boards, whereas municipalities are most interested in housing.

Possible gains of Red for Grey:

- Stimulating coordination between different development sites;
- Prevention of cherry picking;
- Possibilities to speed up developments;
- More attractive tenders for developers by combining sites of different financial risks.

When working out the Red for Grey concept in relation to brownfield development, the following dilemmas arise:

- Legitimacy of squaring accounts with private partners;
- Probable divergence with European state aid legislation;
- Necessary political commitment to redevelopment of brownfields;
- Division of financial risks and gains between parties;
- Lack of greenfield sites;
- Development of one site competes with the development of another site.

Focus

The dimension of the problem definition demands a focus. This focus is chosen in the following method:

- Influence: For Red for Grey a definition of brownfields is only partly needed. Hence, we will not focus on a specific category of brownfield sites. In essence, Red for Grey can be generally applied to balancing costs between profitable and unprofitable sites. The reason for combining the two developments is crucial, however.
- Intensity of survey: In this study, we will focus on the first description of possibilities for squaring accounts at profitable sites for the redevelopment of brownfields. To do so, we will identify three scenarios that are related to the ownership at brown-

field and greenfield locations. Subsequently, we describe the continuation for further implementation of the Red for Grey concept.

The focus of this survey, thus, is the outline of possibilities for Red for Grey. If sufficient support is recognized, further definition of these possibilities will be part of a future study.

Target groups

The main target group for Red for Grey are municipalities. They have prime interest in squaring accounts in favour of brownfield redevelopment and have been given the opportunity to actively do so through the Land Policy Act. The interest of local governments in brownfield redevelopment lies in their concern for sensible land use, vital cities and sustainable industrial estates. Besides, they are often deficient in financial resources for this redevelopment. Finally, only few people within public bodies have clear knowledge of land policy, whilst chances for redevelopment of sites mainly lay in the combination of diverse disciplines (such as planning, environment and development department).

The main interest for developers is a stable market for selling their plots. This means that programmatic synchronization is important. A possible opposite concern is the enlargement of the balancing of costs through Red for Grey.

A specific target group for Red for Grey are housing associations. They have a clear social aim for realising affordable housing. Above that, they often play a role in realising housing developments at inner city locations. Housing associations' main concern in the implementation of the Red for Grey instrument is the possibility of squaring accounts with private developers in favour of inner city redevelopment and the development of social housing.

Generally, brownfield owners have interest in redevelopment for two reasons as well. Firstly, as dilapidation of their sites causes social pressure from the neighbouring surroundings to upgrade the area. Secondly, as site profits are poor or even negative. Redevelopment and resulting financial resources create means for new investments elsewhere.

The here above mentioned parties have all interest in breaking through the stagnating redevelopment process. Their gains are:

- Financial: Redevelopment offers direct profit for owners and developers;
- Social/spatial: Most brownfields are situated at fine locations within the city boundaries. When it comes to sustainable land use public authorities and housing associations are interested in these locations. For developers sites like these are attractive as the demand for high quality housing at inner city locations is continuously vast. At last, redevelopment of these sites have a positive effect on the surroundings.
- Environment: Pollution of brownfield sites is an environmental risk, which can be controlled by development. This is a public responsibility.

Redefining the possibilities for Red for Grey in the current situation

In the current situation, there are two appropriate applications for Red for Grey. These are to be described before the new Dutch Land Policy Act is portrayed to illustrate the third possible use.

Scenario 1: Brownfield (marginally viable) and viable site, both public property

In this case, public tendering of a combined redevelopment of both sites is possible. This approach makes development of non-paying sites paying by using the profits of a viable site to develop a brown-

field. This approach makes the development of a brownfield more attractive to the private sector.

The new Dutch Land Policy Act gives public bodies more possibilities for recouping costs (kostenverhaal) of brownfield site development. The basis of this law is formed by the view that agreements between partners in urban development are based on civil law, like Public Private Partnerships or Joint Ventures. However, in addition to these instruments of civil law, the new Land Policy Act introduces public law instruments in case the public and private partner do not succeed coming to an agreement voluntarily. This new public instrument is called the exploitation plan (exploitatieplan).

The new law describes the costs that need to be recouped when the exploitation plan instrument is used. Among more, these are soil pollution, infrastructure and green and water facilities. The local government can refuse to provide a building permission if a developer does not agree with the content of a private agreement. In that case the public exploitation plan comes into play.

When judging the possibilities of squaring accounts, three criteria play a part:

- Gain: a new development needs to obtain considerable profit from built facilities;
- Accountability: subject of squaring accounts should be a facility that had not been made if a development had not taken place;
- Proportionality: beneficiaries of a development should contribute to the involved costs pro rata.

When this new act was discussed in parliament one interesting amendment was accepted. This so-called Irrgang-amendment adds to the act the possibility for creating of a fund for squaring accounts between different plans, hence balancing costs between more locations. This offers the opportunity to oblige one that gains profit from a certain development, not at the same development site, to contribute to the costs of this development. A purported government made structure vision should give insight in the relation between developments and the ensuing reimbursement to the fund.

Text box 1: the new Dutch Land Policy Act

Scenario 2: Brownfield site owned by a developer and viable site public property

Offering development rights of a viable site in combination with the obligation to redevelop a (part of a) brownfield site to a private party could be a possible trigger in this scenario. In this case, a developer sells his marginally viable site to the local government. The developer is given development rights of a viable site in return. In addition to this, he is compelled to buy back the - by the government -prepared brownfield site for a market price. This market price lies higher than the cost price. Had the cost price been equal to or lower than the market price, compensation would not have been necessary as the developer could have profitably developed his own site.

The following points of attention play a role in this scenario:

1. Compliance to state aid legislation by the European Union is an important condition in this scenario. The developer should not gain financial advantages in respect to others. All payments should therefore be realistic and market conform;

2. Other types of this development rights scenario are possible when the site ownership is transferred over in other stages of the project. Preparing of the site, for example, should not necessarily be done by the public party and can be carried out by the developer as well. The scenario described above is a general description.

Scenario 3: Squaring accounts via a brownfield development fund (no publicly owned viable site)

As explicated above, the new Land Policy Act offers local governments the opportunity to recover costs of public facilities for brownfields from other developments. It is not needed that these sites are publicly owned. If so, it is up to the public

party to decide whether squaring of accounts takes place between its projects. If sites are privately owned, the municipality needs to use kostenverhaal (recoup of costs) to (partly) regain costs made for public facilities. This can be done through either private agreements or public law instruments (exploitatieplan, also see text box 1).

Despite the fact that creating a development fund for brownfields still holds its uncertainties, the following points of interest play a role:

1. A clear Masterplan (structuurvisie): A clear Masterplan forms a condition for squaring accounts for redeveloping brownfields. The Masterplan should include:

   a. A list of costs that will be recouped on other sites;

   b. The sites on which these costs will be recouped on;

   c. A description of the social benefit of the redevelopment of the brownfield.

1. The actual recoup of costs highly probably requires a clear outline. For this outline, it appears to be reasonable to use the principles of kostenverhaal (recoup of costs), which means:

   a. Recoupable costs should preferably correspond with the register of recoupable costs in the New Land Policy Act;

   b. The profits a location gains from the redevelopment of brownfield need to made apparent;

   c. The question needs to be answered, whether costs are accountable to a redevelopment or had been made either way;

   d. Are the costs that a beneficiary of a development should cover proportional to the involved costs?

After having answered these questions, a contribution of costs ex art. 6.13 of the new Land Policy Act can also be done via a brownfield development fund.

Testing the hypothesis

In chapter one the following hypothesis has been posed:

"Red for Grey offers new possibilities for recoup of costs on greenfields in favour of brownfields ánd that these possibilities can be consolidated by the new Land Policy Act"

The subsequent investigation has made clear that there are two possibilities for squaring accounts if a municipality owns land on a site. These possibilities are strengthened by the new Land Policy Act. The knowledge of these possibilities is not widely spread among local government. The third option of recouping costs from greenfields in favour brownfields is new in with the new land policy act. So far the hypothesis is confirmed.

Roadmap for implementation

Knowledge transfer to local governments is essential for the first two scenarios. This could be done by introducing a users' guide for several target groups within local government (land policy, spatial planning and environment).

The third scenario needs further study in a pilot situation. The legitimate argumentation for recouping costs has two be proven in practice. This will give more insight in the feasibility of recouping costs.

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4.5 Urban Planning versus Urban Management

Jürgen Brüggemann

With the decline of the coal, iron and steel industry, with the abandonment of railway lines and stations, with the closing of complete locations a large amount of land has been released for planning and future utilisation. To bring these former industrial locations into the economic cycle is a task which has gained more and more in importance during the past fifteen years. However, the challenges set for all those involved have changed, due to the very size of these properties. The subject of land recycling began with its focus on the remediation and preparation of the sites for development purposes. The methods and technology employed, evolved primarily from the era of a supply and demand market orientation. In the past, the price of land has increased notably and the market went along with it. Today most of the technical questions have been answered but it is the market conditions which have changed. Consequently, the technology orientated land recycling has developed consistently towards a planning orientated land development.

Urban planning, with its own methods and technology, had firmly established itself. Its task is to fulfil the political objectives for land utilisation formulated in the German Federal Building Act. These objectives include designing, utilisation, environmental protection and others, which must be carefully balanced in a process between professional and political know-how on both communal and regional levels. In the 1990s the focus on the subject of sustainability was increased. This sustainability in town planning set ecological, social and economic demands in a context which secures acceptable long-term town development. This meant a very obvious orientation towards the future, for the next generation and also for a long-term orientation in the land development process. The market situation was seen as

only one of the many demands. Sales and marketing departments which research the concrete market demand were not included in the process until shortly before completion. In the planning phase there was close consultation among the communities, politicians and administration, the professional planners and the land owners to ensure adequate coordination of their different interests. There was too little orientation towards market demand and the financial market was not addressed at all. The financing was covered by community budgets, site owner funding and also public grants.

In Germany, urban planning is founded on the finely-tuned development process for the remediation of the large-scale locations mentioned above. This process begins with a structural concept which defines the basic targets including potentials and restrictions as well as future utilisation. The framework plan converts these targets into planning and designing concepts which are often supplemented by town planning competitions. They are initiated also in order to find solutions to satisfy the differing ideas for end utilisation between communities and land owners. The development plan establishes the definitive legal framework and creates a balance between the different interests. The town council takes a decision on the plan and the targets involved. This process is based on the theory that with these defined targets a compromise between the different interests can be achieved.

Planning Methodology

Based on this process, MGG has developed a value management system, a system which integrates all interests from the owner's perspective into the planning process. This includes the maxim that all operations in a project, no matter how complex, must be geared towards optimising the value of the property. Therefore, an assessment of the possible growth in value stands at the beginning. This evaluation is carried out by establishing a model concept and SWOT analysis. At this point, the decision must be made as to whether capital investment in further development is justified. Following this, the values which are formulated in the legal, economic and organisational aims are determined. Thus, if the economic efficiency analysis is positive, the framework of the development plan is safeguarded from the owner's perspective. However, it might become necessary at this point to reassess the set targets, which could lead to a reorganisation of the planning process. When the development plan and a concrete technical plan are in place, the value can be raised. At this point the land has become available, its qualities have been agreed on, and it is ready for sale.

Value Management

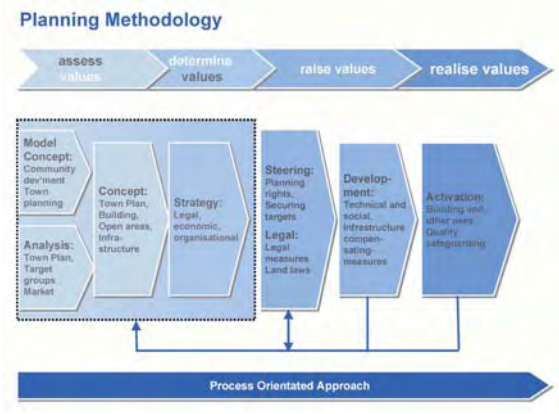

Figure 1: Planning Methodology

This approach is orientated on a conventional planning process which aims at a supply-orientated real estate market. However, it is only recently that this supply market has become demand-orientated. According to the German Federal Office for Statistics, the realisation of land for development decreased between 1994 and 2004 from 15,000 to 7,000 hectares. At the same time the realisation of unprepared land decreased from 8,800 to 700 hectares. This

Figure 2: Value Managing MGG

shows that not only the influence exerted by the economic situation has altered, but also that investment behaviour must have undergone a radical change. As a product, unprepared land has departed the economic cycle. The reason for this can be found in the financial markets. Based on experience in Anglo-Saxon countries, they have identified real estate as a product. The Union Investment Real Estate AG, formerly the German Investment Fund AG, DIFA, formulates this "spot on" in its image brochure: "We think of it as a commodity".

Added to this, mono-structural project developments are becoming more and more difficult to implement. The demand for integrated utilisation is growing, but without the capital market actually having a solution.

The German orientation on middle-term result - which was also legally sanctioned by the German Commercial Code - is often replaced by a short-run stock market orientation. In this new system, only projects which guarantee short-term implementation can be financed. Here it is the guaranteed advance renting or letting which forms the economic basis, while architecture and sustainability serve to create a positive image or to secure location advantages. This is emphasised by financial institutions which must review projects which cover a period of more than three years with a critical eye. This means that long-term land development cannot be financed by the capital market.

Market Structures

Changed market structures offer a further argument against long-term planning. Recently, these structures have been going through an upheaval. Market cycles are moving faster and faster. Technology and production locations are changing their demands. Due to globalisation the demand for large areas is decreasing and the result is a reduction in turnover. If, because of this, the planning structure becomes more complex, a restriction in investment becomes visible. This makes it difficult for landowners and market participants to control the land development together with the necessary town planning. Due to the long "time to market" it has been ousted from the short-term orientated capital market. In the past, the communities were in a financial position to support the necessary tasks for the future.

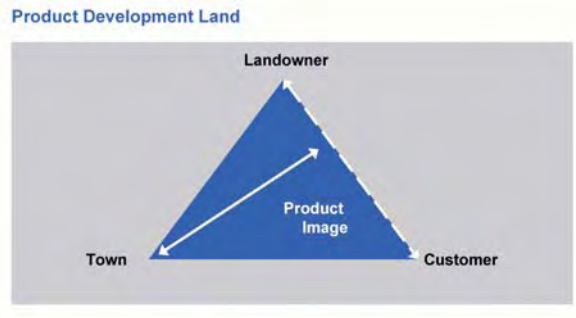

Figure 3: Product Development Land

Product Development

Working on the hypothesis that land development means the development of a new product, it would make sense to apply marketing strategies. The most important target in marketing would be to develop an image profile for the new product. This image profile must launch the product on to an existing

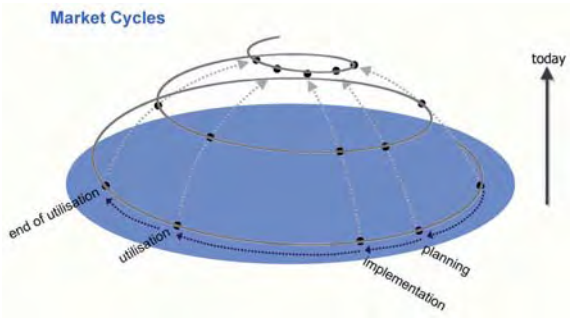

Figure 4: Market Cycle

market, which is characterised by the relationship between producers and customers. Estimating the market incorrectly would result in the product not being sold. A correct prognosis would bring positive results for the company. In the transition from unprepared to developed land, the declared market orientated partnership is overridden by the planning rights of the community. The community is not a market participant unless public funding is involved. In order not to raise false hopes, the community planning sovereignty is an important and incontrovertible law in our democratic state. Land is finite! It must adhere to the demands for healthy living and working surroundings. The communities must be especially diligent and public authorities must, in turn, control them. At the same time this leads to a damaging disruption on the market. We can read in the German "Insurance Company Investment Regulations" from 20th December 2001, §1, Article 1, 14. just how great the risk is rated that communities are in possession of legal planning sovereignty. Here it says, and I quote: "The tied budget may be invested in …already existing developments, developments in hand, or objects for immediate development…" According to the German Federal Finance Office, this excludes all land mentioned in development plans which have not yet been concluded. This means that the political risk in Germany can only be described as almost incalculable.

This risk analysis is carried out as a matter of course during the land development process. The process is determined by the pre-supposition that all conflicts will not be resolved until after all operations have been completed and will then be regulated by a political goodwill process.

The main point of contention in the on-going process must be resolved. The "informal planning" for the larger development areas with varying utilisation structures enables latent conflicts to be avoided. In a period of 4-6 years the conflicts which arise are lifted on to a specialist level. However, experience has shown that in various cases, assessment analyses did not lead to amicable solutions, because there are so many different evaluations of and opinions on the political or market reality. The development planning system allows these difficulties to be laid openly on the table at the end of the process for everyone involved to see. Thus, a product development of "Land with Marketable and Sustainable Properties" eludes normal market mechanisms.

How can we unite these two demands under one roof, to ensure sustainable town planning quality and, at the same time, a short-term investment run for capital orientated companies? It is necessary to develop a process which combines the principles of sustainability with the current situation on the market and financial markets. MGG, with the experience gathered during the realisation of more than forty land development projects, would like to put a process up for discussion which is able to fulfil these demands.

The basic idea of the process is to get all market participants round the table right from the beginning. All sources of latent conflict in the urban planning are to be discussed openly and a consensus of opinion on the development plan should be reached. Administration and Council, Users and investors and the land owners must all participate. Their differing targets should be combined to come to an agree-

ment on the process in hand. This should cover a period of "60 days". Should this consensus of opinion not be reached, the project would be abandoned, at this point. The next step cannot be taken until a consensus acceptable to all parties has been reached. The result represents a "script" which describes the image of the property itself and the surroundings in question, plus the processes for implementation. Within the framework of the "script" it is also possible to involve citizens at an early stage or at any time during the proceedings. After a positive result, the participants have committed irrevocably to the project.

The next step is to make a feasibility recommendation. This makes the first cost-effective analysis on the basis of planning and marketing structures with costs and revenue calculations. This allows the land developers with the necessary capital to take a calculated risk. Over and above, it creates a positive atmosphere for local owners who wish to participate in the development. Owners who require capital at short notice would also be able to sell their property to a land development association at current market value. This is a PPP association which receives all the plans as an assignment. The association is committed to carrying them out. The preliminary costs incurred until the foundation could be financed by the property owners, with risk capital or from public funding. At the same time, it would be prudent to inform users and project developers about the projected image to give them a chance to include their own concrete ideas in the process. It is most important that the agreed image and process be adhered to. These two elements must offer a planning safeguard to those who have participated from very early on. A feasible skeleton plan and the ensuing final development plan are based on the agreed process and determine the intended quality. It would be possible for investors to become involved at short notice. With the resolution of the development plan, planning permission could be granted.

The implementation of the process described above should lead to extended management structures in urban planning. It is the highest aim of management to determine binding target dates, quality and cost efficiency, even if only roughly, at an early stage in the proceedings. It would be possible to satisfy the demands on land development, urban planning and market presence with different urban management. Examples in the Netherlands, Great Britain and the USA have shown us possibilities which we must translate into our German planning culture.

4.6 Environmental Exposure, Liability and Risk Transfer in Brownfield Transactions

Simon Johnson, Alan Shaw

ABSTRACT

Using case studies, the key environmental issues in buying or selling Brownfield and contaminated land to achieve appropriate corporate objectives are presented, principally: (i) risk identification and assessment; (ii) communication and presentation; (iii) evaluation/valuation; and (iv) risk transfer. One common objective amongst corporate sellers is to achieve a 'Clean Exit'. In reality, it is usually a case of 'How Clean is Clean enough'? Crucial to successful negotiations is the ability to quantify financial exposure to environmental liabilities. Examples are given of the use of probabilistic analysis to provide quantified valuations of environmental financial exposure to make commercial judgments about risk retention, environmental discounting and environmental insurance. Risk Transfer techniques including environmental insurance and contractual measures (indemnities/warranties) used to transfer and mitigate environmental liabilities is presented.

Introduction

The business of owning, transacting and developing land, property and operating assets carries the risk of incurring a wide range of environmental liability. These environmental liabilities and risks ultimately result in a financial exposure. Financial exposure may be realised as an immediate and actual cost, say for clean-up, or a potential future liability. In all cases the value of the asset is at risk.

The costs associated with contaminated land may include for environmental consultants (site investigation, detailed quantitative risk assessment, project management); remediation contractors; and lawyers. The costs will fall on one of the following: the polluter; current owner / operator; or previous owners. In addition to the costs for on-site issues, it also possible off-site migration of contaminants could result in third party damage claims, e.g. damage to human health, property or the environment.

The degree to which any one party in a property transaction is exposed to (potential) environmental costs and liabilities can depend on:

- The environmental information available and the state of the land or property;
- Whether the polluter is the current owner, and if not whether the polluter exists;
- Sale and purchase contract terms and conditions;
- Warranties and indemnities, including any that current or previous owners may have entered into;
- Whether there is a standing tenant and the tenant has been made re-

sponsible for environmental costs through their lease; or

- Redevelopment plans and timing.

Environmental responsibility and liability can extend beyond the purchaser, seller and original polluter to include: tenants, investors, lenders, and where the property is part of a managed investment portfolio, the managing agents, the investment managers and any trustees.

Understanding all these elements, and how they fit together in an environmental context, is the key to designing an appropriate programme to minimise both the potential costs and any contingent liabilities.

This paper advocates a structured approach based broadly on a process of review, identification, evaluation and execution (of the transaction). Case studies are used to illustrate the various techniques and processes discussed. The paper also introduces and discusses the concept of 'Clean Exit' strategies.

Identifying the Risks – Environmental Due Diligence

When buying or otherwise acquiring land, property or even businesses the environmental condition of the land is a principal issue. Discovering the condition is a process of due diligence. For a buyer, this might be restricted to information provided by the Seller, although in many cases the Buyer will be encouraged to obtain their own information, even to the extent of carrying-out on-site investigations (with the permission of the Seller).

Table 1:Examples of different categories of Environmental Risk, Liability and Exposure

Technical e.g. residual contamination left in the ground or entrained within stabilised or treated materials or otherwise contained post development	**Legal** e.g. Regulations, EU Directives, Country regulation and civil liability
Financial e.g. remediation cost overruns; future costs of litigation; accounting provisions – IAS37; property value and valuation	**Contractual** e.g. warranties, collateral warranties, indemnities, sale and purchase agreements construction

As part of due diligence it is useful to classify the risks identified as either: technical, financial, legal or contractual risks. Typical risks in each of these categories are illustrated in **Table 1**. As we shall see later, to construct an effective transaction, with agreed (between the parties) apportionment of environmental risk, liability and exposure it is necessary to consider the risks in the context of a structured approach.

In the main, it is usual for an environmental consultant to identify known and potential issues. Depending on the detail of information they will attempt to provide a range of costs against each of the principal exposures, often in terms of reasonable (best) case and worst case or similar. Similarly lawyers will identify the principal legal liabilities.

A Structured Approach to Risk Management

The diagram in Figure 1, if followed takes either a qualitative or quantified route to risk assessment, with both paths then leading to risk retention, transfer, management and mitigation.

First it is necessary to identify and describe the risks and whether these are known (actual) risks or potential (future) issues.

A number of questions follow, for example:

What does this mean for the transaction? Typically the Buyer may seek to negotiate an environmental discount and/or perhaps obtain an indemnity or warranty from the seller. How much discount? What should be the scope and terms of the indemnity? What about security? Will the indemnity actually respond? Are Warranties also required? What about the liability associated with any retained risks?

Figure 1: Structured Approach

Your initial position in how to respond to these queries can be ascertained by a clear understanding of your client's objectives:

- What is their risk appetite? What are their objectives in terms of risk transfer or risk retention? Is a 'Clean Exit' required; and
- Technical/financial modelling of the risks (legal, regulatory and third party and contractual) identified by the environmental information to provide the basis for:
  a. negotiation of price, terms and conditions of sale or purchase including level of any indemnity;
  b. accounting (e.g. use of provisions) and tax opportunities; and
  c. the design of risk transfer/risk funding/self insurance solutions.

This information allows the team to have further detailed and informed discussions and negotiation on a environmental financial risk management programme that provides, in relation to price paid, a financially efficient programme of risk transfer and risk retention (including the use of contractual indemnities and/or warranties).

The benefits of this approach include:

- Protection for investors and other stakeholders against both short and long-term liabilities;
- Reduced risk: technical, financial, legal, contractual;
- Facilitation of the transaction to minimise time & maximise return;
- Control over the effect of environmental liabilities and exposure on the balance sheet;
- Protection of management, investors and other stakeholders against both short and long-term liabilities;
- Future proofing against the impact of 'new' regulation.

It is therefore considered that in the case of acquisition, early consideration of the exit strategy can help to facilitate value creation for investors/funders.

Financial Risk

Technical/Financial risk modelling offers a transparent and replicable methodology for assessing the potential financial exposure to environmental risks and liabilities. Using Monte Carlo type procedures, allows for the impact of key variables to be quickly and effectively analysed. The output, as shown in Figure 2, can be used directly to inform decisions about risk retention and risk transfer.

Clean Exit

In commercial terms a 'Clean Exit' is where the Seller, and original polluter (or other principal responsible party) is able to sell with minimal residual liability for environmental issues. Figure 3 below represents a hierarchy of clean exit strat-

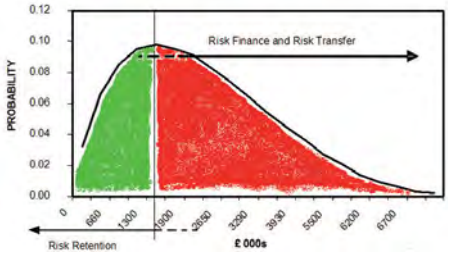

Figure 2: Financial Modelling – diagram of typical output

egies. The options listed in Figure 3 demonstrate increasing security for the Seller: from bottom – least secure; to Top – most secure. A 'Clean Exit' is often required by corporate Sellers where they can feel exposed to future liabilities as the former owner (and polluter), but also as a 'deep pocket'. This is especially the case when selling for redevelopment.

In practice, a full 'Clean Exit' is rarely achievable, companies having to decide on and settle for a strategy that provides under the specific circumstance of the transaction a 'Clean Enough Exit'.

Risk Transfer Products and Solutions

There are a number of risk transfer products and solutions that can be used to construct an effective and efficient strategy. Table 2 list the principal options available for transferring historic liabilities. Some of these options are so called Alternative Risk Transfer (ART) techniques. Within the list, many of these options can be combined to create a comprehensive programme, for example blending risk transfer and risk funding. The principal method for transferring risk in the majority of transactions is through insurance, and the use of site pollution legal liability policies. These policies provide protection against third party damages (property damage and bodily injury) and regulatory action both on and off-site, as well as legal defence costs.

Table 2: Risk Transfer Options

Example Risk Transfer Options		Application	Type
1	Environmental Pollution Legal Liability Insurance (PLL)	Unknown costs	Insurance
2	Remediation Cost Cap Insurance	Known costs overruns	Insurance based
3	Liability Assumption – by third party contractor	Unknown and known liabilities and known costs overruns	Insurance based
4	Captive Insurance Company – set-up entirely by LRT to take risk	Known and unknown and liabilities	Insurance based
5	Protected Cell Company (PCC) - Rent-a-Captive – LRT rent cells (requires less capital support)	Known and unknown liabilities	Insurance based
6	Finite risk – risk funding – pre- and/or post-loss (no risk transfer but smoothes cash flow in event of loss)	Known costs and liabilities	Financial
7	Escrow accounts	Known costs and liabilities	Financial
8	Bonds and Surety	Known costs	Financial

The case studies demonstrate how some of these products and solutions can be used to facilitate transactions, transfer risk and create clean exit structures.

Case Studies

The following case studies draw on real cases, however, key elements etc. have been changed to maintain anonymity and protect confidentiality.

Case Study 1: Site Sale for Redevelopment - UK

The site, occupying around 2ha, was located within a small town and had had a number of previous uses, including manufacturing of engineering parts for the motor industry and latterly as a garage and car showroom for motor sales and servicing. The site was situated on a major groundwater resource although there was no abstraction within 2km of the site. The surrounding area was predominantly retail and residential properties. The retail units had all recently been re-

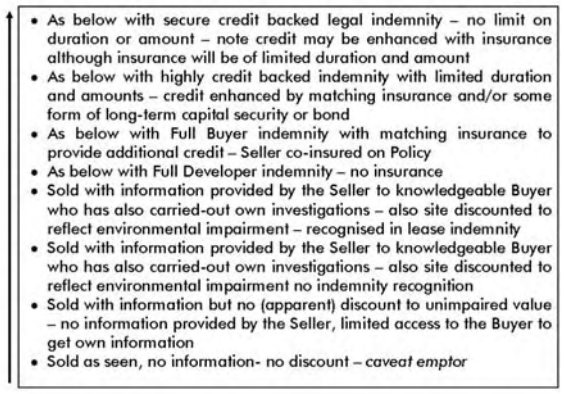

Figure 3: 'Clean Exit' Hierarchy

developed from previous light industrial uses.

In this example the structured approach comprised of assessing Seller information and making independent enquires to verify this information. The outcome was that two hotspots of hydrocarbon contamination were identified, requiring remediation, other wise the levels of contamination were within guideline values on a risk assessed basis for redevelopment and reuse for non-food retail. The Seller also required the Buyer to provide an indemnity, essentially holding the Seller harmless for all past, current and future environmental liabilities.

This created a problem for the Buyer in that any future sale may be affected by the indemnity.

The solution was for the Buyer to provide the indemnity on the basis that (1) the indemnity could be insured under an environmental site pollution liability type policy and (2) the Seller paid for this insurance.

The main benefits included the facilitation of the deal through the insurance; protection of longer term liquidity (ability to sell on in the future); and securitization of the indemnity reducing any influence of the indemnity on the Buyer's balance sheet.

Case Study 2: Sale for Investment - Germany

The site, occupies around 3.5ha with a long history of uses including glass making. Part of the site has been redeveloped for retail use. Environmental investigations undertaken for the redevelopment did not reveal significant contamination and reuse for retail allowed for the majority of the site to be overlain by hardstanding and buildings.

However, there were also suspicions that key hotspots of hydrocarbon contamination, possibly from previous fuel storage, whilst mostly removed from the site as part of the works, could have migrated off-site, and present an ongoing pollution problem.

The Authorities therefore insisted on a post-redevelopment groundwater monitoring programme in order to show there was no continuing pollution from the site at unacceptable levels. Although initial data suggested that there was no problem, the buyer, would nonetheless be taking on this liability. The Buyer, a property investment company and its bank, were particularly concerned about this issue as the uncertainty about future conditions affected the value and security of the site as an investment. Therefore to facilitate the purchase a solution was required.

The solution accepted by both parties to the transaction was for an environmental insurance policy to be taken out in the name of the Buyer and its bank which provided cover in the event that the monitoring triggered action by the Authorities. At the same time the Seller was required to pay the costs of the monitoring until no longer required by the Authorities (believed to be 2-years, subject to no issues arising).

The Seller required an indemnity from the Buyer, but concerned over the financial status of the development vehicle pur-

chasing the site also required the indemnity to be backed by environmental insurance and to be a named insured on the insurance policy.

Case Study 3: Portfolio Investment - Europe

In this case the principal issue was in understanding the extent of the potential financial exposure to environmental risks and liabilities. The approach taken in this instance was to use the environmental reports and due diligence to construct a stochastic model (Monte Carlo model) for the portfolio. The probability of regulatory action leading to damages and a loss, and the overall uncertainty about what any damage or loss may cost were modelled. The modelled outcome for the portfolio is illustrated in Figure 4. This suggests that the total most likely exposure or cost is around 6.2m Euro with a far lesser chance (5% residual risk) that the costs may be as much as 9.2m Euro. This information was then used to:

- Negotiate a discount on the transaction price;
- Obtain bank funding – based on the risk to senior debt;
- Determine the parameters (amount and duration) of the indemnity provided to the Seller (in return for the discount); and
- Inform the negotiations on the possibility of obtaining significant environmental insurance to back the indemnity risks.

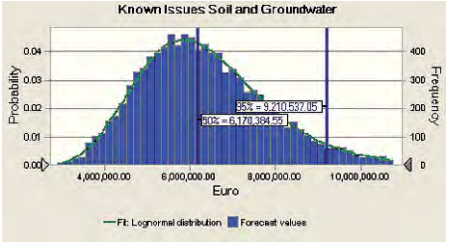

Figure 4: Monte Carlo Output for financial exposure to Known Issues

Conclusions

All transactions, by their very nature require liabilities to be transferred and/or retained by the Buyer and the Seller respectively. Most liabilities are those that attach to any business or property transaction and are considered a normal part of business, such as property value, development potential, planning permission etc. Environmental liabilities increasingly are becoming a normal part of business risk and in common with other transactional liabilities create actual and potential (future) financial exposure.

Taking a structured approach, and particularly the quantified route, enables the issues to be identified, valued and therefore addressed at the right time – not when a deal is on the table and nearly struck. As illustrated by the case studies, value can be protected and even created – environmental insurance is usually assignable and, for example, can support value and increase investment potential and options.

Transacting Brownfield and contaminated land will continue to present a challenge. However, experience coupled with an expanding range of financial tools means this challenge can be met with confidence.

5

Environmental Aspects

5.1 Innovative Revitalisation concept for a former Storage Area of Patrol Products in Bucharest, with pilot character in East-Europa

Thomas Meyer-Murlowsky, Gerhard M. Buchholz

ABSTRACT

As an example for the revitalisation of an abandoned industrial site in Eastern Europe, we present a case in the North of Bucharest, where our client Petrom S.A. decided to work at high standards to assure the revitalisation of a plot with ca. 200.000 m² in one of the best locations of the town. The site was used since 1936 as a storage for petrol products, and shut down in 2005. Actually it is planned to re-use the site as commercial and residential area.

The site has typical soiling due to the 2nd world war bombardment, 1940 and 1977 earthquakes damages and former use. In 2006 ZÜBLIN Umwelttechnik GmbH developed an innovative concept for the revitalisation of the site, in accordance with the client and the Romanian Authorities. The renaturing - remediation concept, developed on the base of German Law for contaminated sites, giving high priority to the pathways soil-human, soil-plant and soil-groundwater, was accepted formally in August 2006 by the environmental agency of Bucharest.

Introduction

Since 1st of January 2007, Romania is a member of the European Union, and among others, facing the challenge to reach high environmental European standards. The political and economical power of the country is concentrated in the capital city Bucharest, and as presently the 2 million metropolis is faces a "construction boom", the available area for expansion in good location is limited.

Therefore one of the largest stock exchange based company in Romania, and actually biggest oil company in South-East Europe, PETROM S.A., member of OMV Group since 2004, decided to built their future centralized office "Petrom City" (see Figure 1) on the premises of their former fuel depot in northern Bucharest, at Straulesti street, District 1, BANEASA.

From a total surface of approx. 200.000 m² of the site, the building complex will have 46,000 m² office space and an additional approx. 30,000 m² will be built underground. When it is finalized, Petrom City will host all the Petrom employees in the Bucharest offices and other central services currently distributed over the country. Currently there are around 3,000 employees located in 5 offices in Bucharest and its surroundings [1].

Figure 1: aerial view of the site with planned building "PETROM CITY"

In accordance to the environmental corporate responsibility of Petrom, in consideration bombarding of the 2nd world war , 1940 and 1977 earthquakes damages and high priority of the long use of the site to store and handle oil products, some site investigations have been realised [2, 3] until summer 2006. These studies confirmed the presence of typical soiling in soil and ground water, and thus a concept to clean the site was developed.

As Romania joined the EU no more than some months ago, and on behalf of economical and legal environmental situation before, nearly no experience does exist with the revitalisation of these kind of sites. Therefore it can be said that the cleaning of a site of these dimensions is the 1st approach in Romania to realise remediation activities. Together with the Petrom S.A. and Romanian Authorities, the remediation concept is based on the following strategy:

- Application of existing Romanian laws
- In the case of missing Romanian regulation, definition of strategy in the style of the German law to protect soil "Bundes-BodenschutzGesetz"
- Defining of reasonable targets based on a specific Risk Assessment of the site

For the revitalisation of the plot, the following activities are designed, using International and German technology as "state of the art":

1. biological treatment of soil
2. extraction of floating oil-phase
3. pump-and-treat of groundwater

Table 1: general info site „former oil terminal Baneasa"

Location:	3 km northwest of the Centre of Bucharest, towards International Airport Otopeni
Direction:	Bucharest / Sector 1 Sos. Straulesti Nr. 69-71
boundaries:	North: Coralilor street East: Straulesti street West: Butan Gas terminal South: Butan Gas storage
Coordinates (Centre):	X: 553350 / Y: 343952
Level:	+87 m ü. NN
Morphology:	mostly flat, smooth slope towards east
former use:	tank and distribution centre since 1936
actual use:	abandoned area
planned use:	building of new PETROM headquarter, residential and commercial area
surrounding use:	commercial / residential adjacent superficial
water bodies:	Lacul Baneasa, 150-300 m northeast, Lacul Grivita, 200 m northwest

Description of the site

General

Some details regarding the former PETROM oil terminal is described in Table 1.

Geology and Hydrogeology

The site is located inside of a valley, formed by the River Colentina. The underground is characterized at the upper part by quaternary deposits of Upper Pleistocene – Holocene age, consisting of loess silty clay and alluvial gravels, 13-33 m thick. Under the silty clays the deposits of middle Pleistocene are following layers with a total thickness of 100-180 m, with silt and numerous sandy lens intercalation, and inferior Pleistocene with sand and gravels intercalation, which can be 20-40 m thick are situated.

In the subsoil of the site 3 aquifer complexes are existing:

- the shallow "Colentina-aquifer", used sporadically, with a thickness of about 10 m consisting of sand with gravels, in a depth of 4-6 m below top ground surface, transmissibility 1x10-2 m²/s, ground water flow towards East

- the "Motistea-aquifer", used locally, consisting of more saturated zones, summarized as "upper Motistea-Aquifer and "lower Motistea-aquifer":

  * upper Motistea-aquifer: about 7 m consisting of graves and casually fine sands, in a depth of ca. 25 m below top ground surface, transmissibility 1,6x10-3 m²/s

  * lower Motistea-aquifer: aprox. 90 m below top ground surface, thickness 10 m consisting of fine sands, transmissibility 5,8x10-4 m²/s to 1,4x10-3 m²/s

- the deep "Fratesti-aquifer", exploited intensely, main water supply of Bucharest region, consisting of three horizons („A", „B" and „C"): about 170 m below top ground surface, thickness 10 to 40 m, principally sands and gravels, transmissibility's between 1,1x10-3 m²/s and 6,7x10-3 m²/s

The hydro geological situation in the "Colentina-aquifer" is influenced by the water levels in the adjacent rivers "Lacul Grivita" (northwest of the site, upstream) and "Lacul Baneasa" (northeast/east of the site, downstream). The general groundwater flow direction is west to east (see Figure 2).

Figure 2: general groundwater flow direction

Local geology near surface

During the drillings was found this typical profile:

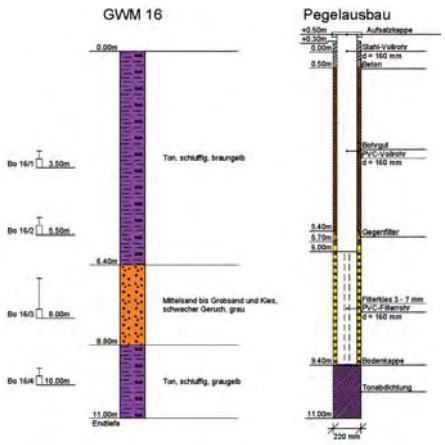

Figure 3: typical profile of the local geology

Some significant deviations of this profile were found in a few drilling points:

- the silty layer can reach a thickness up to 7 m, on the other hand this layer was nearly completely eliminated due to former construction works

- locally, gravels were found directly

below the silty layer

- the basement of the sand/gravel layer varies between 8.5 m to > 15 m

Results of site survey

Investigation activities

In October/November 2005, HALCROW realised a first investigation to determine possible soil and groundwater contamination [2]:

- analysis of the aerial-view of bombarding
- surgery clearance before drilling
- construction of 14 monitoring wells MW 01-14, with a maximum depth of 14 m
- drilling of 20 boreholes, 2 m deep
- sampling of soil, soil vapour and groundwater
- sampling of construction materials
- analysis of TPH, PAH, BTEX, VOC's, SVOC's and heavy metals, as well as general chemical analysis

In February/March 2006, EISELE, as a subcontracted company of Strabag Austria, realised a detailed investigation, including the following activities [3]:

- construction of 23 monitoring wells GWM 01-23, with a maximum depth of 15 m
- drilling of 40 boreholes, to a max. depth of 7 m
- sampling of soil, soil vapour and groundwater
- realisation of pumping tests in all existing wells
- analysis of TPH, PAH, BTEX, VOC's, SVOC's and heavy metals, as well as general chemical analysis
- special analysis of oilphases found in the site, floating on the groundwater
- exact topographical documentation of wells and boreholes
- calculation of a 2-dimensional numeric model with FEFLOW 5.0

Soil

Mainly due to the bombardment during WW II (see Figure 4), a pollution with hydrocarbons was to be expected, and found in various parts of the site in significant concentrations as well in the saturated and unsaturated zone, but especially in the capillary fringe.

Figure 4: Bombardment of BANESA oil terminal in WW II

Fortunately no other contaminants, like PAH, BTEX and heavy metals are present in remarkable concentrations in soil. Therefore TPH will be used as key parameter to describe the situation in the unsaturated zone. Elevated concentrations of TPH were detected near surface in these zones:

1. waste oil distribution zone, northeast
2. elevated tanks, central area
3. northern railway – filling area for trains

Considering the total surface of nearly 200,000 m², about 20% shows a TPH-

contamination near surface. In contrast is the situation in the zone of the capillary fringe in a depth of 4-6 m. In this zone TPH was detected in elevated concentrations in a larger area (Figure 5):

Figure 5: TPH-concentrations in water fluctua-

Soil vapour

In some areas elevated concentrations of volatile compounds were detected, especially BTEX (Table 2).

Table 2: analytical results of soil vapour (BTEX)

sampling point	borehole	∑ BTEX [mg/m³]
waste oil distribution (northwest)	RKS 1 RKS 2 RKS 3 RKS 4	n.d. 19 3 2
railway filling zone (north)	RKS 6 RKS 7a RKS 8 RKS 10	n.d. n.d. 350 3010
truck filling zone (east-central)	RKS 15 RKS 18 RKS 19 RKS 20	20 37 487 7
tank area west	RKS 23 RKS 24 RKS 26 RKS 29 RKS 30 RKS 31 RKS 32 RKS 33 RKS 34	n.d. 21 6 n.d 74 155 12 4 10
tank area east	RKS 35 RKS 36 RKS 37 RKS 38 RKS 39	319 208 12 50 252

n. d.: not detectable

Detectable concentrations of chlorinated solvents have been detected partially only in the filling zones of the railway and trucks. Comparing to the BTEX-aromatics, the concentrations are low (less than 25 mg/m³, only one value with 87 mg/m³).

Ground water

The detailed sampling of February 2006 confirmed the presence of BTEX-aromatics in the 1st "Colentina-aquifer" (see Figure 6)

A similar picture was determined regarding TPH, although it seems to be that the basic concentration of TPH in this 1st aquifer is, due to anthropogenic activities, about 0,2 mg/l to 0,4 mg/l. Noticeable are the elevated TPH-concentrations in the wells GWM 12, GWM 20 and GWM 21, which gives a clear indication that in this zone a pollution was caused separately (see Table 3).

MTBE was detected partially – but always linked with elevated BTEX-concentrations – in max. concentrations up to 1,500 µg/l in well MW 08). MTBE-concentrations in any case are lower than BTEX-aromatics.

Figure 6: BTEX-concentration in groundwater

Table 3: analytical results of groundwater (TPH, BTEX)

well	TPH [mg/l]	∑ BTEX [µg/l]
GWM 4	0,3	51
GWM 5	0,4	1
GWM 13	0,4	2
GWM 17	n.d.	n.d.
MW 13	0,9	55
MW 14	0,4	n.d.
GWM 01	0,3	n.d.
GWM 02	0,2	8
GWM 03	0,1	-
MW 02	3,1	6,05
MW 03	0,8	5,4
MW 06	0,3	6,11
MW 07	0,9	2,66
MW 08	1,1	2,87
GWM 12	6,9	633
GWM 18	1,6	7,82
GWM 19	0,2	221
GWM 20	6,1	2,8
GWM 21	2,3	109
MW 09	1,0	2,81
GWM 08	0,2	581
GWM 09	0,4	82
GWM 10	0,4	5
MW 11	0,7	2,89
MW 11	0,6	2,45
GWM 06	0,2	1,6
GWM 07	0,5	3,44
GWM 14	n.d.	1

n. d.: not detectable

Floating oil on groundwater

Since beginning of the detailed investigation in February 2006, floating oil was detected in the wells installed on the site. Depending on the water level, the oil-phases in the wells can be measured in about 20 wells, at a thickness of 0,01 m to max. 1,50 m. The composition of the different floating oil phases is shown in Table 4).

The distribution of the floating oilphase is illustrated in Figure 7.

Table 4: composition of oil-phases

Sampling point	Composition of oil-phase
GWM 12	Diesel
GWM 18	ca. 70 % Gasoline ca. 20 % Diesel ca. 10 % high-boiling components
MW02	ca. 75 % Gasoline ca. 20 % Diesel ca. 10 % high-boiling components
MW07	ca. 45 % Gasoline ca. 40 % Diesel ca. 15 % high-boiling components
MW08	ca. 40 % Gasoline ca. 35 % Diesel ca. 25 % high-boiling components

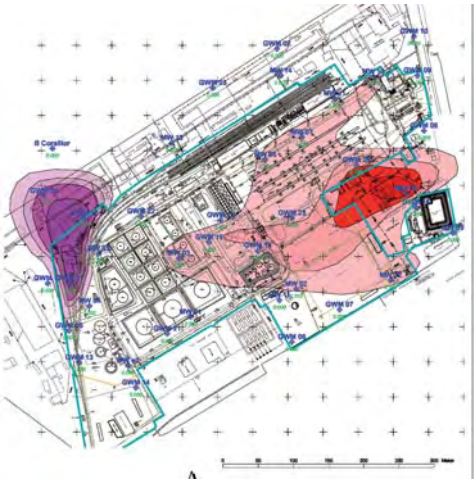

Figure 7: distribution of the oil phase

Remediation concept

Legal basis

In beginning of 2006, during the development of the Remediation concept for this site, in Romania has existed these corresponding environmental Norms:

- M.O. 756/1997 [4] Romanian Guidelines Values for Trace Elements in Soil (normal soils, alert thresholds for sensitive and less sensitive uses, action thresholds for sensitive and less sensitive uses

- Law 458/2002 [5]: definition of the quality of drinking water (modiffied by Law 311/2004 [6]) including a table of maximum concentrations of heavy metals, some ions, pH and COD

- M.O. 95/2005 [7] regarding waste acceptance criteria for landfills, defining maximum acceptable limit values, applicable for construction materials

Therefore only for contaminated soil the M.O. 756/1997 and for waste materials the M.O. 95/2005 could be considered for the development of the remediation concept, whereas for contaminated groundwater no appropriate Norm to define target values for the contaminants TPH, BTEX and MTBE was existent. On behalf of this legal situation in Romania, the philosophy of the German Law „Bundes-Bodenschutzgesetz" [8] and the German Decree „Bundes-Bodenschutz- und Altlastenverordnung" [9] was considered additionally to develop the specific remediation concept for this site.

Among the basic principles of these German regulations is the definition and evaluation of pathways (see Figure 8) and use-exposition-references.

Measures for the Revitalisation of the site, agreed with Romanian Authority

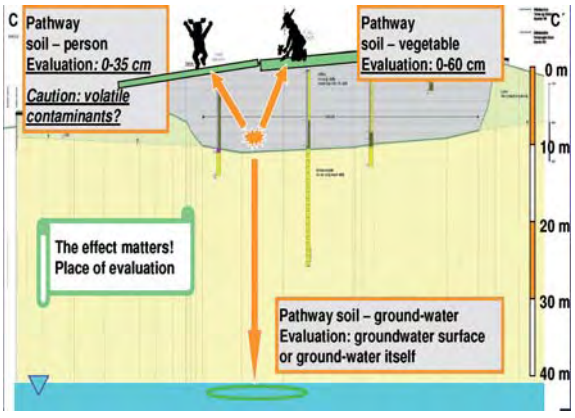

Figure 8: principle of pathways [3]

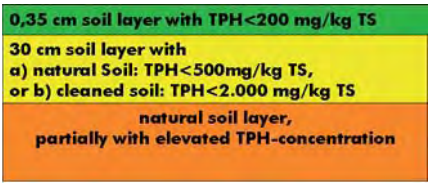

Figure 9: visualisation of soil remediation measure

In several meetings with the participating parties, the following remediation concept, as a balance between legal basis and reasonable proportionality, was agreed [10]:

- Soil remediation in defined zones (figure 9)

  * excavation of contaminated soil to a depth level of 0.30m if necessary, cleaning of soil to reach a target value according Romanian Directive M.O. 756/1997, for TPH action threshold for less sensitive uses 2,000 ppm, for BTEX alert threshold for sensitive uses 25 ppm, 0.25 ppm for Benzene, using the biological process, and refilling of cleaned soil.

  * Covering with a layer of 0,35 m with a layer of natural soil which fulfils the alert threshold of M.O. 756/1997

  * installation and operation of soil vapour extraction systems to capture volatile hydrocarbons released by the Bio-Airsparging

- Groundwater:

  * installation of a hydraulic barrier in the downstream of the former oil terminal, pumping of polluted groundwater with flow rate based on the numeric modelling [3]

  * continuous treatment of the polluted groundwater with multi-stage treatment plants, produced in Germany, to guarantee lowest target val-

ues for the re-infiltration of cleaned water upstream of the site

* installation and operation of 2 galleries of injection wells to realise the Bio-Sparging process, to reduce effectively the pollution with a natural degradation process

* installation and operation of numerous systems (using different technologies) for the extraction of floating oil phase

This remediation concept was agreed and legally validated at 23rd of August 2006, documented as "Aviz de Mediu" [11].

The decontamination of the site is planned for a time-period of 3 years, whereas the activities has already started in beginning of 2007.

Conclusions

The described project is the 1st revitalisation of a large abandoned site with huge dimension in Romania and of big interest for the Romanian authorities, Bucharest's habitants as well of Petrom S.A. Together with all political levels, which are responsible in Romania for environmental issues, and a group of European experts, a working group has developed an innovative remediation concept, finding a reasonable compromise between existing legal basis in Romania, the Mid European law and proportionality of investment. The collaboration of an open-minded Authority and a responsible owner is a worth imitating procedure in South-East-Europe.

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5.2 Urban soil ecology, scientific perspectives II: Urban wide pollution of soils, an ongoing process and a challenge to sustainable development

Stefan Norra

ABSTRACT

Urban activities alter chemical patterns of soils on locally limited or urban wide scales. An important process altering soils on an urban wide scale is the diffuse pollution. It is shown that soils of urban systems are already polluted for extended areas. Persistent urban sprawl and densification will lead to ongoing soil pollution. For many pollutants soils act as long-lasting sink resulting in the accumulation of pollutants. However, pollutants fixed in soil also can be released and percolate towards the groundwater or taken up by organisms via various pathways. Thus, sustainable urban development requires combined management and control of urban wide conditions of soils and chemical substance fluxes. Methods, such as geostatistics and multivariate statistics are presented, which allow to model and assess urban wide soil alterations. These methods provide an indispensa-ble and comprehensive understanding of the spatial distribution of urban wide pollution and alteration of soils.

Introduction

The world wide ongoing process of urbaniza-tion depends on the consumption of one important resource: soil. Urban expansion results in sealing, loss, destruction and pollution of former agricultural, forest or natural soils. Urban development also can damage and pollute remained inner urban soils. Soil is a kind of resource, whose value is often not very obvious to the public since in many cases soil destruction and pollution cause indirect negatively impacts, such as flooding, groundwater contamination, reduced groundwater recharge, air pollution, contamination and loss of vegetation and wildlife. Conclusively, the condition of urban soils plays an important role for the living conditions of human beings in urban systems. Besides other ecologically important functions soil provides in urban systems, it is a major sink for pollutants. Once incorporated into soils, pollutants, especially organic ones might be decomposed in soils, but many of them are accumulated for a certain period. However, decomposition products and accumulated pollutants, such as toxic heavy metals, can be leached towards the ground water body, taken up by plants, dispersed with soil particles to become part of particulate air pollution or, as constituent of soil, excavated and transported to other locations. Since pollutants in soils are not everlasting fixed, although they might be fixed for a very long period, their accumulation and behaviour in soils has to be studied and monitored. Any urban development causes an alteration of the former occurring chemical conditions and patterns of chemical elements and compounds in soils. Owing to the fact that various chemical elements and compounds are toxic and that specific chemical conditions intensify or mitigate their toxicity, sus-

tainable urban development has to take into account its influence on the resource soil. In the following, soil pollution will be discussed and methods will be presented, which can be used to model urban wide soil pollution.

Pollution of Urban Soils

Pollution sources are commonly grouped into point, line and diffuse sources. Thus, soils are locally polluted with respect to a limited area, or soils of expanded areas missing definite limits are polluted. The first case includes urban soils with disturbed profiles because of intensive and various development activities and land uses that cause different levels of pollution (Blume 1992, Radtke et al. 1997, Blume and Schleuß 1997, Hiller and Meuser 1998, Meuser et al. 1998, Zhang et al. 2005). If in those cases threshold values set for toxic compounds are exceeded, various technical cleaning methods are already available, such as bioremediation, soil washing, or even excavation and artificial rebuilding of the soil.

In the second case, decontamination often would make necessary extremely intensive monetary efforts. This case occurs if soil naturally show high concentrations of toxic compounds (especially heavy metals) owing to its parent material. Fur-thermore, this case can occur in urban systems where air polluting activities (traffic, industry, domestic heating, …) implicate permanent atmospheric inputs of toxic elements into soil resulting in creeping and increasing soil pollution, and where intensive and expanded industrial emissions pol-lute soils via various pathways. For that reason, the German Federal Soil Protection Act and the Federal Soil Protection and Contamination Ordinance defines a special assessment of those soils. Enacted threshold values can be exceeded as long as no negative impacts to soil functions are expected owing to the release of toxic compounds from those soils.

Toxic compounds accumulate in urban soils to various degrees with respect to their degradability and immobilization. Especially heavy metals will be accumulated, since they can not be decomposed and often are immobilized at neutral pH values as typically found in urban soils. Consequently, soils of any urban system will show anthropogenic elevated concentrations of heavy metals compared to the rural or natural surrounding as already demon-strated by many studies (Blume and Hellriegel 1981, Sühs 1986, Paterson et al. 1996, Sánchez-Martin et al. 2000, Bityukova et al. 2000, Norra 1997, Norra 2001, Norra et al. 2001, Möller et al. 2005, Xinmin et al. 2006). Furthermore, every specific urban land use type has its own balance of chemical substances (Thornton 1991, Baccini and Brunner 1991, Baccini and Bader 1996, Stüben and Norra 2000, Kuang et al. 2003) often manifested in patterns of chemical elements found in soils over extended areas (Bloemen et al. 1995, Herget 1996, Mesilio et al. 2001, Norra et al. 2002). This permanently ongoing process of creeping soil pollution occurring on extended urban areas necessitates comprehensive monitoring and assessment of urban substance fluxes and soil pollution as well as the regionalization and model-ling of the urban wide soil pollution (Norra and Stüben 2003, Norra et al. 2006a). According to the concept of sustainable development, the resource soil has to be preserved and protected owing to its importance to an intact and worth living urban environment. Methods are needed to differentiate between local and diffuse soil pollution, to model the urban wide soil pollution, to attribute multiple superimposing soil pollution on respective pollution sources, and to calculate accumulation rates of ongoing diffuse pollution.

Atmospheric deposition rates of heavy metals and other toxic compounds are frequently measured using various methods (Lahmann 1990, Landesanstalt für Umweltschutz Baden-Württemberg 1997). These results have to be assessed with respect to urban soil pollution. An attempt to calculate the period necessary to enrich the most upper soil layer (0-5

cm) by 1 ppm of specific heavy metals was carried out for several sites in Karlsruhe (Norra 2001). On the basis of atmospheric deposition rates surveyed between 1996 and 1998 (Norra and Stüben 2004), these periods are for Pb about 10 to 30 years, for Cu about 4 to 40 years and for Cr about 10 to 70 years. However, more comprehensive studies are necessary to investigate the creeping accumulation of persistent toxic compounds in soils with respect to their varying mobilities. Furthermore, any urban system will develop its own characteristic accumulation rates of pollutants in soil.

Fingerprinting methods on the basis of specific patterns of chemical elements occurring in soil can be used to identify pollution sources. Comprehensive literature is available describing the emission patterns of chemical elements for various anthropogenic activities (e.g. Nriagu and Pacina 1988, Merian 1991, Hutzinger 1992, Farago et al. 1995, Kabata-Pendias 2001). Generally, specific chemical compounds and elements and their ratios can be used to identify relevant pollution sources. Platinum, Pt/Rh ratios and ratios of stable isotopes of carbon can be used to identify traffic as relevant pollution source and sources of changed soil composition (Schäfer et al. 1999, Türke et al. 1999). It was shown that Sb can be used to identify lead works as soil pollution source (Norra et al. 2001). Vanadium can be used to assess the influence of emissions from processing fossil fuels in urban systems (Norra 2001). Studies remain to be done to balance the chemical composition of urban soils according to the specific shares of individual sources (specific pollution sources, geogenic background, biotic origin). One approach could be to transfer chemical mass balance source apportionment models known from the investigation of atmospheric particulate matter (Watson et al. 1994, Kleemann et al. 1997, Lewis et al. 2003, Christen-sen 2004) to urban soil assessments.

Modelling the Spatial Distribution of Urban Soil Pollution

Sustainable urban development has to take into account the condition of urban soils to preserve or to redevelop an intact environment. Therefore, comprehensive knowledge on urban wide soil quality is necessary. Furthermore, aggregation, regionalization and cartographical presentation of data ascertained for single soil sites are necessary to assess urban soils as a whole and in relation to the total urban system. Geostatistics have been demonstrated to be a strong tool to model the urban wide soil pollution (von Steiger et al. 1996, Shinn et al. 2000, Norra et al. 2001 Norra et al. 2002, Hooker and Nathanail 2006). This method is not only usable for the spatial distribution of toxic elements but also for other soil properties such as mineralogical composition or stable isotope abundances (Norra et al. 2005, Norra et al. 2006b, Boeckx et al. 2006). Geostastics is based upon the variogram that describes the spatial variance of a particular variable. An experimental variogram is calculated from the available data set. A variogram model is fitted to this experimental variogram. This model is used for the kriging procedure, which interpolates the spatial distribution of the values of a variable over a defined area. Cross validation is a method to detect outliers not belonging to the overall spatial distribution of a particular variable expressed by the variogram model. The value of a specific variable is successively calculated at each sampling point using the ascertained values of that variable from the other sampling points. A sampling point becomes an outlier of the available data set in case of a too large deviation of the calculated value from the measured value. Such sampling points often show local peculiarities of soil properties not belonging to the overall spatial model. An example is given in Figure 1. 62 surface soil layers (0-5 cm) sampled in city of Karlsruhe were analysed for Cu (Norra 2001). An omnidirectional exponential variogram model nested with a

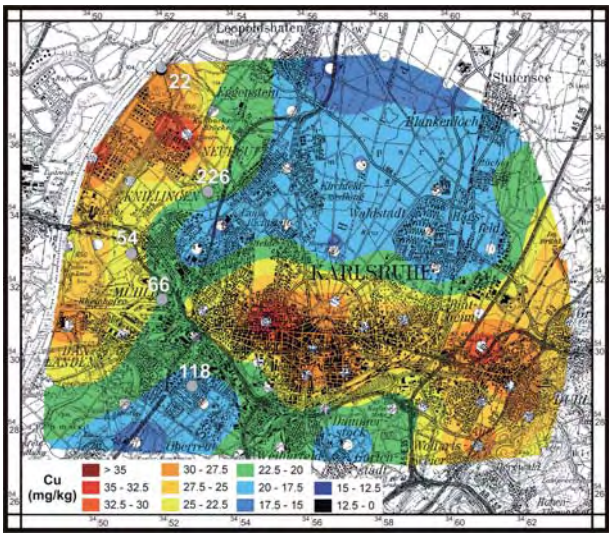

Figure 1:
Visualized spatial model of Cu concentrations in surface soils (0-5 cm) of Karlsruhe.

An omnidirectional point kriging using an exponential variogram model nested with a nugget effect forms the basis of this map. Circles represent soil sampling sites. Sites indicated by grey coloured circles were eliminated from the data set on the basis of cross validation. Numbers express analysed concentrations at those sites. (Copyright Topographical Map: Landevermessungsamt Ba-den-Württemberg 12.05.1999, Az.: 2851.3-A/37)

so called nugget effect could be fitted to the experimental variogram. Pointkriging was used to calculate the spatial distribution of Cu. Naturally, highest concentrations can be expected in soils developed on floodplains along the river Rhine in the west and along the former river system Kinzig-Murg and the northern edges of the Black forest in the west. Lowest concentrations naturally should be found in the soils of the central terraces consisting of sand and gravel. The map displays a superimposition of anthropogenic and geogenic Cu concentrations. Clearly visible are the elevated Cu concentrations in the centre of the map, where the City Centre is developed on the terraces. This area of elevated Cu concentrations is connecting the western and eastern areas of naturally higher concentrations. However, also in the west and the east urban activities led to elevated spatial Cu concentrations. These activities are especially linked to the long lasting urban land use in the former City of Durlach in the east and to the river port and the refinery of Karlsruhe along the river Rhine in the west. Cross validation was used to detect local outliers of the spatial model for Cu concentrations in urban surface soil. Altogether five location were found reflecting mainly local properties. These sampling sites are indicated in the map. One sampling site was situated on the area of a sewage plant (226 mg/kg), another site was located leeward to a coal heap and in between electrified railroads (66 mg/kg), a third location reflects the pollution owing to a historical waste dump site (118 mg/kg) as well as most probably the fourth site does (54 mg/kg). The fifth sampling site indicates an outlier because of relatively low Cu concentrations (22 mg/kg) most probably due to construction activities (artificial levee) at the mouth of the Karlsruhe oil harbour. Furthermore, geostatistics can be used to model the probability of exceeding guideline values by means of indicator kriging and conditional simulation (Markus and McBratney 1996, Nathanail et al. 1998, Hooker and Nathanail 2006).

Multivariate statistical methods can be used to extract dominating processes and factors evoking specific patterns of realizations of variables, such as chemical compositions of soils. Cluster analysis (CA) and factor analysis (FA) have been used in studies on urban soil pollution to differentiate between various element sources (Manta et al. 2002, Madrid et al. 2004, Lee et al. 2006, Norra et al. 2006b). CA and FA can be carried out according to group variables (R-mode) or cases (Q-mode). Typically, R-mode clusters or factors comprise variables (element or mineral concentrations, soil properties) attributable to specific proc-

esses and sources, such as parent materials, land uses and specific pollution sources. Application of the Q-mode of these methods groups cases according to similar patterns of variable values. With respect to spatially distributed soil sites, q-mode analyses result in conclusions about the spatial influences of extracted factors or clusters (gained in R-mode using the Ward method). A cluster analysis carried out for Karlsruhe surface soils (0-5 cm) (Norra 2001) resulted in four major clusters: anthropo-cluster (As, Ni, V, Fe, Cd, Ag, Sn, Sb, Pb, Cu, Cr, Ba, Zn), organo-cluster (organic C, S, N), carbon-ate-cluster (pH, Sr, Ca, carbonate-C, $\delta^{13}C$), silicate-oxide-phosphate-cluster (K, Rb, Ga, Ti, Y, Nb, Zr, La, Ce, Mo). Q-mode cluster analysis revealed clusters describing the spatial relationship of soil sampling sites (Figure 2). Calculating the average values of the variables used facilitates the attribution of the Q-mode clusters to the R-mode clusters. Cluster 1 comprises soils showing elevated concentrations of carbonates especially occurring on the young floodplains of the river Rhine (carbonate-cluster). Two sites of this cluster can be found in the city`s centre and in the east of the town. Obviously, the geochemical composition of these sites does not fit to the surrounding conditions probably due to anthropogenic soil admixtures or soil rearrangement. Cluster 2 comprises sampling sites showing intensive anthropogenic pollution (anthropo-cluster). Cluster 3 comprises samples characterised by silicates, oxides and phosphates (silicate-oxide-phosphate-cluster) mainly occurring in the Black Forest area and along the former Kinzig-Murg river system (older floodplains). Cluster 4 indicates samples of no specific chemical characteristics primarily found on the lower terrace formed during the last iceage. Blue bordered yellow circles represent a subclass of Cluster 4 showing highest average concentrations of various heavy metals (Cr, Cu, Pb, Sb, Sn, Ag, Cd, As) (anthropo-cluster) within cluster 4. Thus, subclusters provide detailed information on minor influences determining the soil composition.

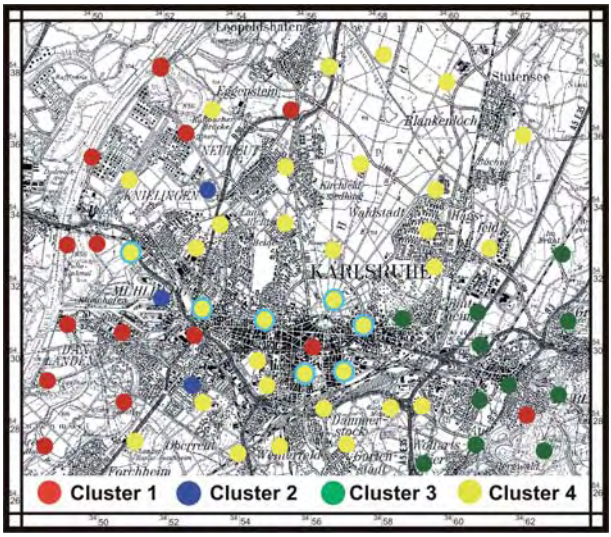

Figure 2:
Result of q-mode cluster analysis of surface soils (0-5 cm) using the method according to Ward. Each colour represents a specific cluster. Explanations for clusters and blue bordered yellow circles are given in the text. (Copyright Topographical Map: Landesvermessungsamt Baden-Württemberg 12.05.1999, Az.: 2851.3-A/37)

Similar to CA, FA results in factors extracted from a set of variables. More and above that, FA provides factor loadings expressing correlations between the variables and the factors. Factor scores express the realisation of an extracted factor at a specific site. In this way, the relative influences of specific factors (frequently identified factors are for example: parent material composition, various industrial pollution sources, atmospheric pollution, various land uses, etc.) on soil composition can be calculated for every soil sampling site. Furthermore these factor scores can be interpolated in the same ways as other variables. Such studies were carried out for instance in Berlin (Birke et al. 1993), Tallinn (Bityukova et al. 2000), and Pforzheim (Norra et al. 2006b). This

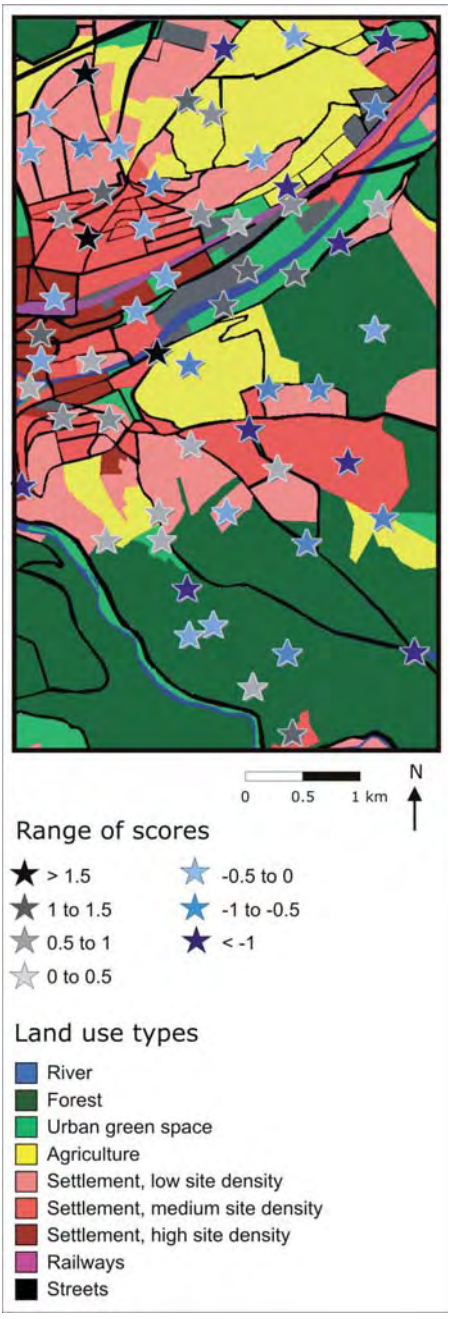

Figure 3:
Factor scores representing heavy metal (Cu, Zn, Ag, Sn, Pb) pollution of Pforzheim surface soils (0-5 cm). Every star indicates a sample site plotted on a land use map.

approach makes it possible to differentiate between geogenic and anthropogenic influences on the soil composition. Figure 3 presents an example for the spatial distribution of scores of the anthropogenic factor extracted from a broad data set that was detected in soils of Pforzheim (Norra 2006b). This factor is correlated to typical anthropogenic emitted elements (Cu, Zn, Ag, Sn, Pb). Highest factor scores indicating most polluted sites are found in the city centre, adjacent to roads, and in the vicinity of industrial complexes. Lowest scores primarily occur in the southern forests. Other factors extracted in this study describe the influence of the parent material and weathering processes on the soil composition.

Conclusively, various statistical methods are available to model the spatial distribution of urban soil pollution, to differentiate between local and diffuse pollution, and to identify the geogenic background. Studies using these methods are mainly carried out for surface soil layers. Almost nothing is known about the spatial correlation of the composition of deeper soil layers and horizons. Such studies would allow the urban wide assessment of the historical development of spatial urban soil pollution and the translocation of soil pollutants towards the depth.

The Meaning of Spatial Soil Pollution to Sustainable Urban Development

The importance of soils to a sustainable urban development and the preservation of intact urban ecosystems has been widely expressed (Maler and Fitger 1990, Blume 1992, Burghardt 1994, Hinzen et al. 1995, Burghardt 1996). Soil provide several important functions for urban ecosystems, such as ground water protection and recharge, protection against erosion, preservation of soil biota, filtering of harmful substances, nutrient and water storage capacity, which have to be considered by urban development activities. Hence, any urban development activity has to exam-

ine subsequent alterations of affected soils with respect to their meaning to intact urban ecosystems (Fitger and Mahler 1990, Koch 2001). In addition to soil type and location oriented assessments and a growing awareness for urban wide pollution scenarios evoked by atmospheric gaseous and particulate pollution, more emphasis is required for a comprehensive urban wide understanding of soil pollution and soil functions. Various urban soil properties and functions are not limited by the borders of properties, districts, specific land uses, or lithological units. For instance, Norra et al. (2001a) clearly detected soil pollution in the vicinity of former lead works caused by this plant, although this plant was already removed and the directly appendant ground was already remediated at the time of the investigation. Atmospheric soil pollution, diffuse pollution sources, groundwater recharge and pollution, natural background concentrations and other factors often do not stick to strict borders. Any urban development will cause alterations of the mineralogical and chemical composition of soil. According to the concept of sustainable development, also the use of soil has to „meet the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). Resource consumption rates shall not exceed rates of regeneration; and in cases of non renewable resources consumption shall be limited by the ability of creating equivalent substitutions. Urban development has o treat soil as a valuable resource according to both before mentioned aspects. Hence, urban wide models are required to assess soil alterations owing to urban development and creeping diffuse soil pollution. Geostatistics provide variogram models expressing the urban wide baseline of diffuse soil pollution and allowing the identification of local soil alterations. Mulitivariate statistics can be used to compare compositions of soils on an urban wide scale and to perceive the dispersal of soil properties of different origin. Moreover, sustainable urban development demands the management and control of urban wide material and chemical substance fluxes (Baccini and Brunner 1991, Simon and Fritsche 1993, Baccini and Bader 1996, Einig and Siedentop 1999, Stüben and Norra 2000). The resource soil has to be embedded in such a management system considering all aspects of local and spatial fluxes of materials and chemical substances.

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5.3 Integrated investigation and management of groundwater contamination - project MAGIC

Grzegorz Gzyl, Thomas Ertel

ABSTRACT

State-of-the-art remediation of contaminated groundwater is still based on single-site approaches neglecting cost-effective regional groundwater management and urban planning aspects. All measures aim at a rapid reduction in environmental damage so that risk to the public associated with a particular property is removed. However, this approach fails in heavily polluted areas with different property owners and complex pollutant patterns. Therefore, integrated approach to such areas, could benefit with improved cost-effectiveness of the whole process of investigation assessment and remediation. The innovative integrated concept for groundwater assessment and remediation at large complex urban areas was developed within FP5 project INCORE (EVK1-CT-1999-00017). The idea currently is in implementation phase at four test sites in the frame of INTERREG project MAGIC (5C028). The test sites are in: Trachy – County of Gliwice (Poland), Olsztyn (Poland), Stuttgart – Feuerbach (Germany) and Ostrava – Vitkovice (Czech Republic).

Introduction

Industrial development in the last few decades was rapid and caused urban groundwater pollution, often exceeding the legal limits. Changes in land use during this period have created complex contamination patterns, such as heterogeneous distribution of contaminants, the presence of different contaminants and large areas of landfill (Figure 1). State-of-the-art remediation of contaminated groundwater is still based on single-site approaches neglecting cost-effective regional groundwater management and urban planning aspects. All measures aim at a rapid reduction in environmental damage so that risk to the public associated with a particular property is removed. However, this approach fails in heavily polluted areas with different property owners and complex pollutant patterns. Large amounts of private and public money are being spent to identify and assess point sourc-

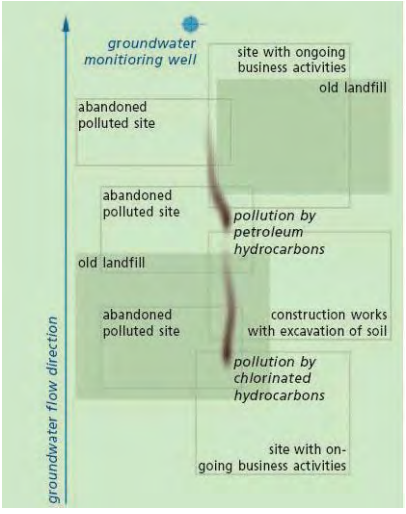

Figure 1: Complex situation of groundwater pollution at industrial area

es of contamination without being able to reliably quantify their impact on the groundwater quality; numerous remediation schemes are undertaken without an economic evaluation of their long-term performance. Therefore, there is a need to implement problem oriented strategies for large complex industrial areas. These strategies would include administrative procedures, urban planning aspects, and real estate market needs. Key goals to be met are the conservation of groundwater resources and economic revitalisation of urban industrial areas.

The innovative integrated concept for groundwater assessment and remediation at large complex urban areas was developed project INCORE (2003). The idea currently is in implementation phase with special focus on the states that accessed EU in 2004 – this is being done in the frame of ongoing INTERREG project MAGIC (2007).

Figure 2: INCORE cyclic approach

Integrated approach to groundwater investigation and management

As mentioned above, the industrial areas are usually places with complex contamination pattern, where single site approaches fail and lead to misuse the funds for investigation and especially for remediation. On contrary, integrated approach to such areas, could benefit with improved cost-effectiveness of the whole process of investigation assessment and remediation. Keeping that in mind, an innovative cyclic approach to industrial areas has been developed within INCORE project (Figure 2). This approach begins with the screening of groundwater plumes at the scale of entire industrial areas, and ends with the remediation of individual source areas or the containment of plumes. The major advantage of this approach is that the number of local scale sites, or the size of the area to be considered, is reduced stepwise from one cycle to the next. Thus, a large potentially contaminated area would be screened but ultimately only a small area may need to be remediated. This new approach repeats an investigation/assessment/ revitalisation cycle three times at different scales: Cycle I - plume screening; Cycle II -source screening; Cycle III - plume/source remediation. This approach, developed in RTD project INCORE is now being tested and implemented within project MAGIC, with main

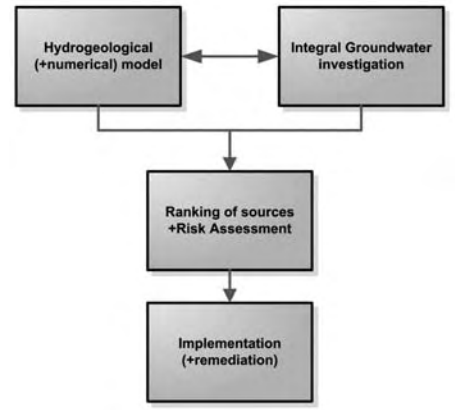

Figure 3: MAGIC approach

focus on plume screening methods and to practical implementation of the integral approach into existing legal and administrative framework (Figure 3).

Innovation in groundwater investigation

The plume screening is mainly done by so called integral pumping tests method, described in details by Ptak & Teutsch (2000). For the interpretation of concentration - time series obtained by these long term pumping tests a transient inversion technique was developed, which is based on a time dependent calculation of isochrones and mass balances for increasing capture zones (Figure 4).

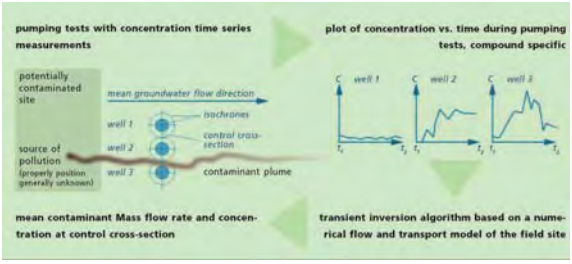

Figure 4: Integral investigation method – Ptak & Teutsch (2000)

The methodology to combine particle tracking in the regional flow model and plume length statistics or reactive transport models to delimit potential contaminant source zones has been developed. By this means large areas can be efficiently screened and mapped. The most important issue is to perform the pumping tests along the control planes perpendicular to groundwater flow direction, downstream suspected area. In this way all contamination plumes are investigated the total contribution of the area to groundwater contamination can be assessed. Furthermore, the risk of omitting a narrow plume of high concentration is eliminated, which is particularly important in case of organic pollutants. In case of diffuse inorganic pollution the control planes may consist also from the dense network of classical monitoring boreholes, forming a control plane. Such case is currently investigated within MAGIC project.

Ongoing implementation

The implementation of these technical achievements into existing legal framework and administrative procedures is essential in order to make the benefits from the integral concept possible. The different national legal frameworks make the implementation phase demanding, therefore an EU-project integrating the local authorities from different EU countries seems to be the best way to realize this task. This is now being done within an INTERREG IIIB project MAGIC. The integral approach is in implementation phase through 4 pilot projects at 4 MAGIC test sites. The result will help to develop a standard handbook for application of integral approach to groundwater contamination at industrial areas. Below follows the brief characteristics of MAGIC project test sites.

Landfil area Trachy (County of Gliwice), Poland

Trachy test site in Poland, County of Gliwice (Figure 5) is a large rural area with 3 landfill sites: mining waste dump (the largest), municipal waste dump and post-

Figure 5: MAGIC test site in Trachy – County of Gliwice (Poland)

galvanic waste dump.

The site is located at the westernmost edge of Upper Silesian Coal Basin, and it borders with a natural landscape park. Groundwater is polluted there mainly with sulphates, chlorides and variety of metals.

Postindustrial area – ex gasworks site in Olsztyn, Poland

The site in Olasztyn, Poland, is a post-industrial area planned for revitalisation and future re-use. It is located very near to historical city center, in vicinity of green-lands (Figure 6).

MAGIC project activity in Olsztyn site concerns level and spatial distribution of ground and groundwater pollution. The contamination stem from tars and other wastes remanded after 100 years old gasworks that was operated in the neighbourhood of the city centre till the nineties of XX century. Besides a strong need to render the terrain accessible for investments there is also a necessity to assess the hazard of main groundwater intakes contamination. The crucial problem are toxic and carcinogenic substances, such as organic volatile aromatic compounds (VOC), including benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs). The precise pollution outlining is the key for the future remediation.

Feuerbach Valley, Stuttgart, Germany

Figure 6: View from MAGIC test site in Olsztyn (Poland) over the old town

Figure 7: MAGIC test site in Stuttgart – Feuerbach (Germany)

This site is a large industrial quarter of the city with dense infrastructure (Figure 7). Some northern city districts of Stuttgart - the project area "Feuerbach" there under - are handicapped by serious soil and groundwater contamination generated over decades. 300 contaminated sites within the project area originate complex groundwater pollutions, more than 200 sites are known or suspected to discharge chlorinated hydrocarbons (CHCs) into a complex layered fractured rock aquifer system. Data of 900 groundwater monitoring wells were existing in the project area in the beginning of the MAGIC project. On the basis of a data collection, evaluation and additional field studies a hydrogeological and a numerical model were designed to characterise the groundwater situation of Feuerbach and to identify the most serious polluters within this area.

Ex chemical coking plant Vitkovice in Ostrava, Czech Republic

This site is located in post industrial area of former coking plant, in the city center of Ostrava. Coal-tar products heavily contaminate the locality in the neighbourhood of this city - the centre of Moravian Silesian Region, in the area of a former chemical cooking plant in Vitkovice (Figure 8). High concentrations of PAHs, aro-

Figure 8: MAGIC test site in Ostrava – Vitkowice (Czech Republic)

matic hydrocarbons (AHs) and inorganic pollution, including occurrence of Dense NonAqueous Phase Liquids (DNAPLs) Layers, has been detected in groundwater.

Conclusions

The industrial areas are usually places with complex contamination pattern, where single site approaches fail and lead to misuse the funds for investigation and especially for remediation. At such areas there is a great demand to improve reliability of investigation and cost-effectiveness of remediation. In response to that, an innovative integrated concept for groundwater assessment and remediation at large complex urban areas was developed within FP5 project INCORE. The integral approach is now in implementation phase through 4 pilot projects at 4 test sites in the frame of an INTERREG project MAGIC. The result will help to develop a standard handbook for application of integral approach to groundwater contamination at industrial areas.

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5.4 Urban Soil Ecology - Involvement of Diverse Land Use Types

Wolfgang Burghardt

Abstract

In urban areas exist numerous new land use types which became the environment of soils and did give soils new properties. Peculiarities of urban areas are beside natural soil, truncated, mixed or stratified deposed natural and technological materials (rubble, ashes etc), mining wastes, sealed soils.

Important urban soil properties are a wide range of humus and lime contents, and pH-values, deep compaction, reduced fine earth content by stones, pollution and dust deposition, soils from sealed layers, and from recent strong soil development processes.

Urban soils are involved in the chain of distribution, dilution and decay of noxious compounds, as sources of dust and pathogenic micro-organisms, in urban heat regulation, supply of heat for domestic heating, for storm water infiltration, rooted bodies for production of large amount of green mass, as very interesting habitats, and as great sinks for carbon dioxides.

Soils with most valuable properties are those from silt and loam, of high humus content, and influenced by groundwater. Urban soil policy and management should know where are the high value soils located, and preserve and protect them.

Introduction

The mental focus of humans is always directed on few main objectives. We must state that beside very few characteristics the soils and their properties not belong to these objectives. They are not present in urban planning and management. The existing interest on urban soils focuses on pollution, and recently on soil sealing. Arguments for this are health risks from pollution and more diffuse arguments of habitat losses and floods from storm water. In most cases health risk studies concern very peculiar items such as the content of selected pollutants of waste tips and of derelict industrial sites. Main criteria of interest is the pollutant content and sometimes the availability of pollutants for the path soil-groundwater and soil-plant. Habitat studies focus on the loss of species of the area by sealing.

For other urban health hazards such as from fine dust (PM10, PM2.5) the role of soils is not evaluated. That urban areas would contain the most interesting habitats due to their extreme and rare combinations of soil properties is not registered.

Urban soil research is more or less not far from its starting point. Only few pieces of the urban soil puzzle are known. They will be presented. Perspectives are not only hazards from soils but also the great benefits in urban areas.

A systematic approach which makes visible what is happening in urban areas and how soils are involved is missing. Therefore some ideas about the totality of the soil complex in urban areas will be presented followed by some details about urban soils and proposals for a better use and management of urban soils and land than found today.

For urban administration and policy it is of importance to be aware that for urban sustainability much soil is necessary outside the cities too. This should not be neglected.

Urban soils – a product of urban environment

Let us start with some abstract and general views about soils by the question 'What are soils?'. Soils are solid bodies filled with water, air and organisms. They are located at the boundaries of rocks to atmosphere and biosphere. They are also influenced by water and relief. All together act as factors of the environment of soils. The factors are active and change the body soils with time. Therefore soils develop (table 1). They are in soil science terms objectives of a pedogenesis.

Table 1: Why has land use to focus on soil?

Soils exist not from the beginning! Soils are the result of development processes. Development processes are governed by factors of the soil environment	
(1) Factors are : rocks climate water biosphere relief, and time.	(2) Land use by humans has effectson all of this factors. Today they achieve extreme intensities
(3) Total new landscapes are constructed by land use with peculiar soils, soil properties and effects on life of humans.	(4) Therefore the main principle of soil policy is that it has to focus on land use.

Thus soil can change from a raw stage in a mature stage. In raw stage soils represent only the rocks, in mature stage they are product of the total environment. Thus they became individuals and are the large carrier of information about the elements of landscape, its history and development.

Soils consist of materials such as solids, liquids and gases. The materials give the soils the property to act as storage and transport and supply facilities. The soil facilities will be reported later.

Land is used. Some types of land uses and the benefits from the use are directly depending from the properties of soils. Examples are agriculture, forestry, horticulture. For some other types of land use soils are only the ground above which the land use is performed. The body soil must have only the mechanical property of bearing of loads. Examples are use by constructions and vehicles.

Similar to the natural environment of soils described above land use acts as environmental factor on soils. Humans provide all kind of factors such as loose and solid rock deposits, climatic conditions, vegetation, water and relief.

This way soils get a new environment by soil use. Thus soils of urban areas will be a product not only of natural but in addition or sometimes complete by the urban environment. We must learn and accept that an urban environment will provide soils at least in part with other properties as found in nature.

High diversity of urban land and soil use

In rural areas occur only few types of land uses. With development of cities the number of land use types increased extremely (table 2). Each type of land use influences soils in a characteristic way so that at the beginning of urban soil research some soil scientists classified urban soils by land use types similar as it happened with soils of rural areas in the 19th century. Soil properties which can be expected on a plot can be characterized and described this way.

There is a second phenomenon in urban areas which differs from rural sites. In rural sites processes of material deposition (geogenesis) and change of soil properties are governed by gravity and concentration differences of material and energy in a landscape. Examples are erosion, weathering and humification. Thus exist

Table 2:
Examples of land use of rural and constructed environment and recent extension

1 **Rural areas**	2 **Urban, industrial and mining areas**
Traditional ways of land use: • Forests • Greenland, • Arable land New ways of land uses in rural and urban areas • Water winning area • Highways, streets, sidewalks • Car parks • Railways • Airports • Harbours • Canals • Dams • Drainage systems • Diverse pipe lines • Green houses	• Residential areas • Commercial areas • Hospitals, public buildings • Vegetable gardens • Parks • Industrial production areas • Play grounds, diverse sport grounds • Kindergarten • School yards • Burial ground • Zoo, botanical garden • Urban forest • Sewage plants • Landfill covers • Brownfield covers • Heaps of sludge, domestic and industrial wastes • Heaps of mining waste • Energy supply and storage for heating • Archaeological and historical sites • Natural heritages

between different parts of landscape relationships, and soils in a landscape became relatives.

But the relationship of urban sites is those of plots of different types of land use which is governed by economic and social demands, facilities and processes. The fate of soils and their properties is linked to human mental, social and technological development, and from this resulting urban planning. Examples for land use effect on urban soil properties are differences of soil acidification due to degree of lime supply in not fertilized park areas, fertilized vegetable gardens, residential areas containing lime from rubble residues, commercial areas sealed with concrete stones which weather to lime and railway lines from dolomite ballast.

Peculiarities of soils of urban ecosystems

Where are the soils in urban areas? Do we find the totality of a soil cover in urban areas as exists in rural sites? We find with many urban forests, park areas, gardens and lawn around single, attached and apartment houses, along roads open spaces which are occupied by soils.

Many soils are old natural ones. They are often better preserved in an urban environment than on farm land. Some are relicts because their environment has changed. Examples are relictic Gleyosols which became relicts by groundwater lowering.

A second category is raw soils which are very young soils from mixing, excavation, truncation and deposition of natural soil material.

A third category are also very young soils from recently deposed technological materials (figure 1) such as rubble, ashes, domestic, industrial and mine wastes, slag, sewage and industrial sludge.

There exist a fourth category which is not visible but dominates city centres and many other urban areas. We should ac-

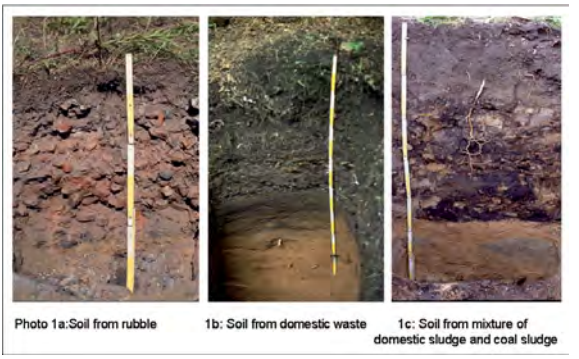

Figure 1: Examples of soils from technological materials

cept and discover that under sealed areas soils can occur, and develop peculiar properties with time. Furthermore the sealing layer can be part of soils.

Some soils of urban land and their properties

There are several soils with peculiar characteristics in urban areas (table 3). One essential characteristic of soils is the content of humus and the thickness of the humus containing layer (figure 2). In urban areas the differences are extreme between individual soils (table 3). Young raw soils (Syrozem or Entisols) from recently truncated soil or deposed material (figure 2 (2a)) have nearly no humus content. It is assumed that in 20 to 30 years they will achieve from humification and incorporation of litter into soils similar humus contents as natural soils (Regosols). With humus content the capacity for beneficial properties of urban soils such as storage of water, nutrients for plants and pollutants will increase.

From amendment with compost and deep mixing by humans Hortisols (figure 2 (2c)) of extreme deep humus accumulation are established. They are the soils with the highest capacities to fulfil soil functions. Therefore they are the most valuable soils found in urban areas. The disadvantage is in some cases the high heavy metal content of Hortisols from use of domestic ashes as fertilizer, and the establishment of vegetable gardens (allotments) on polluted land.

In nature soils achieve their properties by materials deposed by geogenesis and change by pedogenesis. Visible are morphological features such as layers and horizons.

Material deposition by humans also happens by layer formation. The differences to nature are the kind and properties of deposed materials, and combinations of layers from different materials. Figure 3 shows the example of a soil from ashes above carbonate sludge above loess from silty loam and hard coal mining spoil. For example (figure 3) the result can be a peculiar sequence of strong varying pH values with depth from increasing pH to low ones in the deeper subsoil. Or due to the humus, carbonate or iron content layers with strong differences in heavy metal contents occur. Or bulk density and water storage capacity can vary to an extreme extend.

Table 3:
Particular urban soil properties

Of particular importance for urban soil ecology are
• relicts of natural soils
• wide variation of humus content of soils
• truncated, mixed, layered and covered (fossil) soils
• flat to extreme deep compaction
• technological materials (rubble, ashes, sludge etc)
• reduced fine earth content by stone content
• wide range of pH values, from pH 2 to pH 12
• often neutral pH, due to lime content
• wide range of diverse pollutants and height of pollutant contents
• dust deposits and many soil with properties of dusts
• split of river catchment area in many small ones by sealing and other measures
• soils from sealing layers and soils under sealing layers
• some fast soil development processes on technological materials

Figure 2: Examples of urban soils of different depth and amount of humus

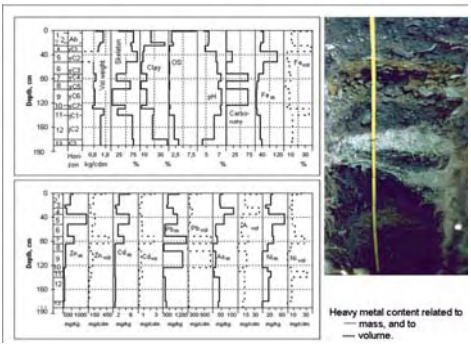

Figure 3: Regosol from technological materials – distribution of properties with depth

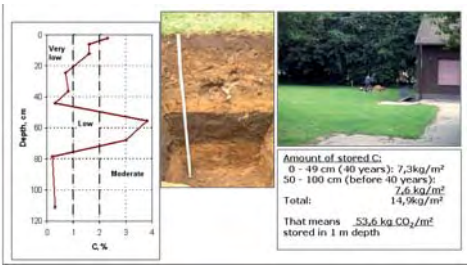

Figure 4: Soil development by humus(C) accumulation in a 40 years old layer from deposed loess loam over a developed Luvisol (Parabraunerde) used as arable land

Covering of existing soils, and soil formation in the deposed material results in sequences of decrease and increase of humus content with depth in soils (figure 4).

Surface compaction is common to many construction sites. A result of soil deposition by layers is also the deep compaction of some soils (figure 5). Content and permeability of air and water of the soil, and use of the soil volume by plant roots is reduced this way.

There is a strong tendency of stone (figure 6) and sand accumulation in urban soils. Stones reduce the fine earth content. But the benefits of soils are bound to the fine earth content. Therefore by stones the storage capacities for water, nutrients, pollutants and heat are diminished. Sand reduces storage capacities of soils too.

Lime accumulates with the deposition of construction waste in urban soils. There is a strong increase of sites with neutral to alkaline pH in urban areas. According to the increase of stone and lime content urban soils became many characteristics of soils of mountain areas.

There are two main reasons for high contents of pollutants in soils:

1. the deposition of materials which contain pollutants. Soil pollution to greater depth can often be related to the kind of deposed technological material and mining waste (figure 7 – tipped soil material). Pollutants can occur in thick layers and to a great depth in high concentrations.

2. the dry and wet deposition of dust.

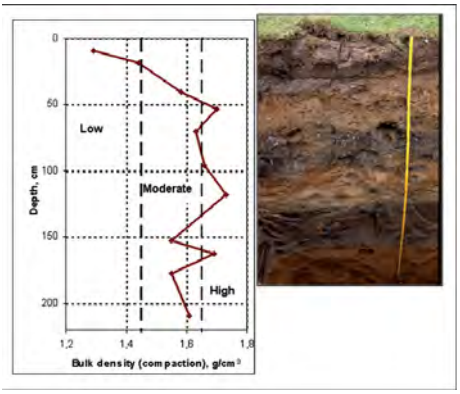

figure 5: Deep soil compaction by several layers from soil deposition by scraper

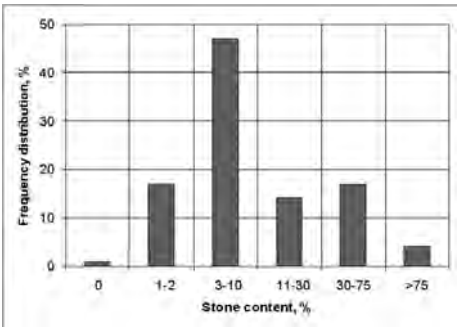

Figure 6: Frequency distribution of stone content of deposed soils of former industrial sites of the middle Ruhr area (from 145 horizons of 51 soil profiles; Kuhs& Burghardt 1988)

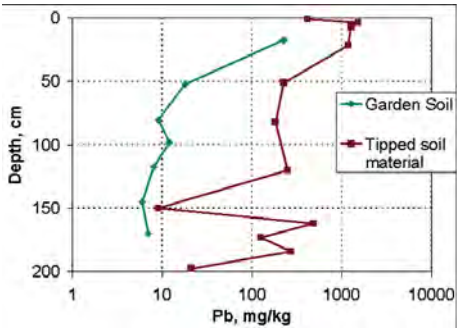

Figure 7: Deep soil compaction by several layers from soil deposition by scraper

Thus top soil layers, in particular the first few centimetre of soils are strong polluted (figure 7 – garden soil).

Dust seems to play a very important role in urban soil ecology. But it is until now not properly studied. Knowledge of the origin, transport and deposition conditions are the key for designation of surface polluted areas (Höke & Burghardt 2002, Ertel & Burghardt 2003). Changes of chemical composition and patterns in top-soils by dust are different (Ertel & Burghardt 2003) from

- road sides with local pattern of Pb and Zn contents,
- domestic heating by burning coal with local pattern of Ba content and pH value, and
- industrial sources and power plants with regional pattern of Mn content.
- Soils can be dominant involved as dust sources. Particular humus content of dust is increased from soils.

Dust plays an important role in formation of many soils (Burghardt 2003). The voids of gravel and stone layers, and rail road ballast are filled with dust (Particle Intrusols). Many surfaces are covered with dust (Aeroliths). Dust intrusion and accumulation occurs into the sand of the gaps of pavement stones

(Dialeimmasols, Wenikajtys & Burghardt 2002). Thus the fine earth content of many urban soils is from dust.

Under sealed areas occur soils (Komossa et al. 2002). This may sound surprising. The body from sealing cover and underlying soil horizons is designated as Ekranolith(raw soils) and Ekranosol(developed soils).

As much as we know today there are peculiar soil developing processes in soils underneath streets. Figure 8 shows pH increase by carbonates from the gravel layer from slag or lime stone of the street. The liming of the soil indicates a water circulation in the soil underneath the street. An other phenomenon can be lack of oxygen and occurrence of reduction proper-

Table 4: Involvement of soils in urban land use

Contributions of soils are both hazards and eco-services.
Hazards are
• sources of pollutants for groundwater, food, human uptake by particles
• occurrence of pathogenic organisms in urban soils
• high diversity of soil eutrophication by nutrient (P, NO3, NH4) content
• consumption of most of the best soils by sealing
Benefits from soil eco-services are
• often high acid neutralisation capacity by lime from rubble, concrete, slag
• immobilisation of heavy metals by lime, high humus and iron content
• sequence of reactor properties for fixing pollutants by soil layers of very different properties
• decay of organic pollutants
• dilution of noxious compounds from dust
• change of particle composition of dust by aggregation
• climatic effects, mitigating urban overheating by soil water content
• use of soil heat storage properties for alternative domestic heating and cooling
• production of green mass and its numerous benefits, of vegetables and other food
• high storage capacity for carbon dioxide
• storm water infiltration
• underneath some sealing layers occur still soils which can be used, so for green mass production and storm water infiltration
• by the wide range and richness of soil properties occur numerous and extreme habitats for flora, fauna and microorganisms
• protection of archaeological and historical sites

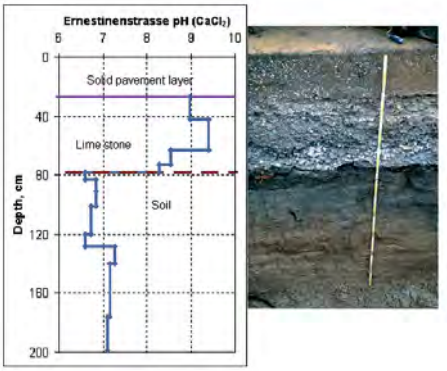

Figure 8: Indicator of water movement underneath sealed areas (street) – soil pH increase due to liming by carbonate release from lime stones of the street bearing layer

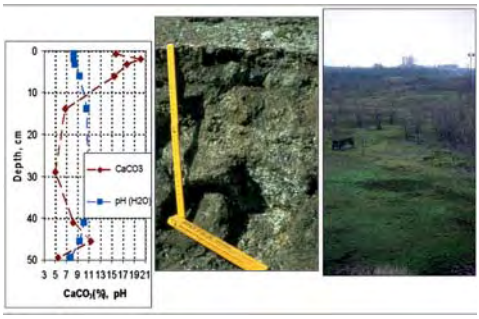

Figure 9: New soil formation in few years on iron work slag by carbonate (CaCO3) formation and accumulation as solid layer in the top soil of a Carbonatosol.

ties (blue colour in figure 8). We can assume also for truncated soils underneath many buildings without and with cellars reduction processes.

Soil sealing, compaction, truncation and deposition of additional soil above an existing ground and of many small plots has a strong influence on the water household. Groundwater recharge is changed and has locally a strong variation. The original large catchment area of a river and its tributary is segmented in many small ones. Examples of such small catchments are houses, streets, underground car parks, landfills which are drained not by the valley drainage system but each by separate drainage facililties. Much more ways of fast seepage water break through to groundwater exist. Groundwater is more endangered by pollutant break through from noxious soil surface deposits and noxious water than in rural areas.

The assumption that soils on recently deposed material are raw soils and to young to be distinct altered by physical and chemical processes must not be valid. Good examples exist already on slag of iron plants (Burghardt et al. 2000). The calcium silicates weather and carbonates are formed (Carbonatosols). The carbonates are concentrated in the top soils (figure 9). Solid layers occur which are typical of regions of other climates such as in semi arid areas (Hungary, Syria) but not known in humid regions as existing in Germany. By extreme high values of pH 9 to 12 of weathering slag silicates are solved and Zeolite as new clay mineral is formed (Sauer und Burghardt 2006). This process is also unknown in moderate humid areas of Western Europe but occurs in the humid tropics.

We must assume that from other technological materials soils with peculiar soil characteristics will develop too. Thus urban landscapes enrich the kinds of soils by additional types.

Where are urban soils involved

We need soils in urban areas as I will show. Urban soils provide a great number of eco - services which are necessary for keeping life in urban areas sustainable (table 4). But according to pollutant contents urban soils are regarded as hazards for groundwater, for the food chain of vegetable gardens and for particle uptake by children on play grounds. Already an industry exists which profession is the cleaning and remediation of polluted soils, or isolating and covering such soils by not polluted soil material. This is expensive and happens were the land can be reused profitable. Thus many areas will stay untreated while not profitable. But this is not acceptable for the demand for save soils

in the city.

Therefore another aspect is of importance. Often discussed is the capability of soils to filter and to fix heavy metals and to decompose organic pollutants. Many urban soils have this capacity due to their content of carbonates which stabilises the pH values by neutralization of acids for many decades and centuries. So most of the heavy metals stay in a stage of low mobility. Bacterial organisms have good environmental conditions to decay many organic pollutants and waste materials. But we know nearly nothing about the real state of the acid neutralization capacity of our urban soils. There is no survey for this.

The survey for a save soil and the soil horizons which are the carrier of the safety compounds in the city must also include other compounds than carbonates. Also iron and humus have the capability to reduce the mobility of metals and for humus to improve the micro-organisms activity for the decay of organic pollutants. But also soil physical properties as water storage properties, air content, air permeability and air diffusion will play an important role in particular for in situ treatments and such of natural attenuation.

The benefits from urban green are well known. Park areas, street trees, urban woods, house, and vegetable gardens deliver recreation facilities. Vegetable gardens are big contributions to the stability of social state of an urban area. But there are many other benefits from urban green. The quantity of urban green is depend from the availability of soils. The quantity of urban green will be also dependent from the quality of soil properties. Therefore it is important to keep high quality soils in the city to generate an optimum of urban green.

A new health issue is the occurrence of dusts. The focus is on their contents of fine particles (PM10, PM2.5) and of pollutants. From our investigations we can assume that most of the dusts is deposed on soils. Soils are great sinks for dusts. From soils dusts are again released. But the dusts from soils have another composition because soils are a strong dilution medium which reduces pollutant concentration. Soils also form by aggregation larger particles. It can be assumed that contents of fine dust fraction in the dust are reduced. Another interesting objective is that dust contains very high contents of organic matter from soils. This will perhaps reduce the availability of pollutants and will increase the aggregation of dust particles. Research about this is missing.

Contact of humans with dust will be by inhalation. The daily soil contact of humans in the city will be with soils (Dialeimmasol) of the gaps between pavement stones. From there at least part of the dust will come which we find and inhale in our rooms. Therefore it is important to study the soils of pavements.

As Russian researchers recently did show (Marfenina 2003) are urban soils a favourable environment for pathogenic micro-organisms. There is an urgent need to prove this, to investigate pathogenic species in soils and the soil properties which enhance their growth and also the transport by dust and uptake by humans.

Due to climate change the world gets warmer and particular city temperatures increase. The urban population suffers, more people get ill, go to hospital, or die earlier, health cost increases strong. The summer 2003 did show in Europe already the big dimension of this scenario.

What are the contributions of soils to mitigate this phenomenon? Soils contain much water. Water is the element which can store high amounts of heat and reduce heat in the air by evaporation of water. Particular loamy soils and soils of high humus contents have a high water storage capacity. These are also the soils of high fertility for plant growth, for vegetable gardens, park areas etc. Therefore for improvement of climatic conditions in cities large areas of not sealed soils must be

Table 5: Amounts of carbon stored to 1 m depth in soils of rural and urban areas

	Ground use	Texture, Material	C – amount kg/m² to 1 m depth
1	Pine wood	Silty sand	13,0
2	Arable land	Silty loam	7,8
3	Garden (Hortisol)	Silty loam	57,3
4	Lawn	Silty loam	13,8
5	Burial ground (Nekrosol)	Silty loam	39,1
6	Green area, gras	Sewage sludge – silty loam mixture	73,8
7	Park area	Silty loam recently deposed	7,2
8	Ruderal railway sidings	Ash above deep rubble layer	4,8

available and stay without any constructions. It is important that the best soils are selected for that purpose. That means it is not permitted to seal soils which contain by nature high amount of water, such soils as loamy soils, with high humus contents, and soils of flood and costal plains.

Due to the need of development of alternative domestic heating and cooling systems to reduce fuel consumption and carbon dioxide release, a new way of soil use, the storage and supply properties of soils for domestic heating and cooling were discovered and are in a developing stage. Soils with high water storage capacities have the highest capability for that purpose.

Most of our income comes from sealing activities or from sealed areas. Sealing is a planning and engineering process. But to keep open grounds for heat mitigation sealing must be reduced and it can be reduced by better engineering and evaluating the economic contribution of any particular sealed area to the society. We must also notice that many of the sealed areas will be the residential areas of the poor in future, and that will create high social and health costs. There is much to do for managing sealing. In the Volume IV of the 'Soil Thematic Strategy' of the European Commission is reported more about this (Burghardt et al. 2004a).

The role of soil science concerns in this context two issues.

1. The urban administration must know where are the soil of high qualities as described above. They must be surveyed by soil science. Soil properties and evaluation maps must be established. This is a very urgent task. Urban planning must be forced to use the results.

2. Underneath sealed areas exist soils. They can be rooted. Why not use this soils for vegetation and evaporate water via high volumes of urban green for heat reduction. Let us develop 'urban forests' on sealed areas. Let us develop techniques to combine sealing with the establishment of a great green volume in the city. Under this aspect also soils of roof top gardens are of importance.

Not longer used sealed areas should be remediated. One way to do this is to remove the sealing layer. Another would be to wait some years. Nature will destroy the sealing layer. Thus natural attenuation of sealed areas such as streets can be performed. Beside this there will be very interesting habitats established.

There is another important contribution of urban soils for mitigating the effects of climate change. Young urban soils have no or nearly no content of humus. They will build up with time their humus content. Therefore this soils have a high capacity for carbon dioxide (CO2) storage (table 3, Burghardt 2002a). But also the establishment of Hortisols and of buried natural soils did fix high amounts of carbon dioxide.

Urban drainage from sealed areas creates floods in the rivers, creates cost for storm water canal systems and reduces ground water recharge. There exist already many new urban construction areas where storm water is infiltrated to avoid this

problems. But for this purpose we need soils with good water infiltration, water permeability and short time and long time water storage properties (Winzig et al. 1999). That means we have to avoid soil compaction. The state of soil compaction should be know in urban areas. New constructions should be established in a way that soil compaction cannot occur. Already compacted soils can be improved by bio-pores such as from earthworms. One can observe that urban soil management can improve the environmental living conditions for earthworms by liming the soils and feeding the earthworms by fresh litter from frequent cutting of lawn. This must be studied more in detail.

The problems of eutrophication by accumulation of plant nutrients such as phosphorous and nitrate in soils is well studied in agricultural sites. Urban areas have in part very low nutrient contents but in part they can be extremely high (Zhang et al. 2001). This can be a hazard for the groundwater. About the real situation in urban areas are nearly no information available.

One of the great demands of the United Nations is the protection and development of habitats. An important contribution of urban soil ecology to human environment in urban areas is the role of soils as habitat. We know that the landscape with the richest flora and fauna in Europe was the 'Kulturlandschaft' which was established by humans by changing soil properties in the 19th century. The 'Kulturlandschaft' is in large parts lost by establishment of the agrarian landscape. A new and similar great evolution of a high diversity of soil properties did happen and still happens in urban areas. Therefore it is not enough only to survey flora and fauna in urban areas. We must know also the soils which are the reason for this new richness.

Urban soils occur with extreme properties. That means there are organisms adapted to these extremes. The organisms of theses soils will have important genetic potentials. This will be also found for soil micro-organisms. Therefore micro-organism research and protection in urban soils would be of interest. It is important to survey urban soils under the aspect of unique habitats for higher organisms and for micro-organisms.

Conclusion - which soils should we protect

We need soils in urban areas. They offer many benefits by eco-services in cities. Not only in the outskirt but also in the city centre their contribution to human quality of life is essential. The above described effects of urban soils demonstrate this.

All soil properties are based on the soil volume. Therefore first of all we have to learn and respect that soils are bodies and not areas and grounds. The main property to protect is the volume of the soils.

Which soils with which properties are of particular importance? Of particular interest are soils of high filter and storage capacities such as from silt, loam and with high contents and amounts of humus. These are soils often found in valleys of hilly and mountainous regions, river and coastal plains, and in old urban vegetable garden areas (Hortisols). Important are also soils containing carbonates and soils which are near to the groundwater. Of interest can be soils from several layers of different natural and technological materials. They are like sequences of filters and reactors with a high potential for groundwater protection (Burghardt et al. 1998).

In urban areas exist a high diversity and richness of extreme soils which have established new and unique habitats. There is an urgent need to check them and to discuss their value.

Urban soils are not only the location of old archaeological sites. They contain also the documents and information about the recent history, the history of the industrial age. They form an unique landscape with wonderful views in general and many de-

tails, for examples old iron works, railway sidings, abandoned streets, slag fields. They must be discovered before they are lost or degraded to the fashion and uniformity of world wide acting landscape and city planners, and architects.

We should not hesitate to include in our planning of residential, commercial, and industrial areas parts of soils from rubble, ashes, slag, railway lines, streets, gardens and others in an original untouched state. My criticism is that too much money is invested to move earth instead to use the same amount of money to find solutions to keep the soils at their place.

We can state that there is an enormous richness existing in urban areas based on ecology of soils from urban land use. First and urgent demand is survey of urban soils and to investigate what has been found. A instruction for urban soil survey is already available (Arbeitskreis Stadtböden 1997), also for survey of sealed areas (iBurghardt et al. 2004b).

For the use, improvement and protection of the soil resources we need an organisation structure. By the 'Soil Thematic Strategy' of the European Commission the re-establishment of a Soil Conservation Service is proposed on an European level (Hoogveld 2004) which has his dominant focus on urban and industrial areas as found in the large belt from Katowice - Ruhr Area - Liege - Lille to Birmingham. They are the areas of the most severe soil degradation in Europe but also of the economic power, and of population and urban areas concentration. Future investments in soils should start here.

Some national soil protection acts and ordinances exist already (FRG 1998, 1999). Their focus is on soil functions. That means they are based on a strong anthropocentric view of soils and their benefits. The soil as an individual which occurs at a site by reasons of a particular environment and history of environment is neglected. But soil protection can be only performed successfully in a context of understanding the environmental short and long time effects. For cities this means both influence of the nature of the landscape and of land use on soils.

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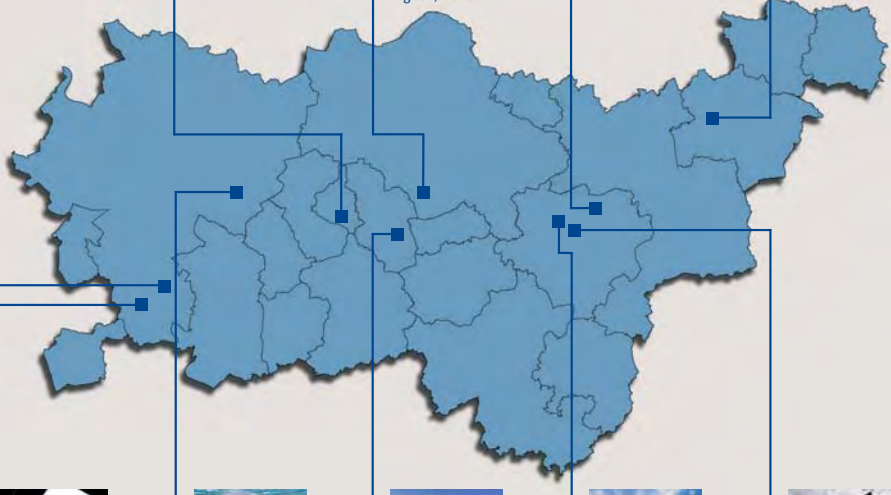

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5.5 Recycling requirements and conditions of degraded grounds in Poland – example of project conducted in Olsztyn (Northern Poland)

Barbara Olszewska, Wojciech Irminski

Olsztyn, the capital city of Warmia and Mazury region, situated in postglacial area of jakes and forests of northern Poland is a city where, as a consequence of economic activation of the region during 1990s (needs of housing construction, changes in the structure of industry, development of tourist facilities) interest in redevelopment of degraded areas situated within city limits increases gradually.

The announcement of Polish Government that redundant post-military grounds currently in the resourced of the Military Property Agency will be transferred free off charge to bodies of local administration did not meet here with much interest as Olsztyn has been redeveloping gradually the industrial areas, old military barracks, warehouses and military depots for a number of years now. The city, thanks to participation in projects co-financed from the European Union gains experience and knowledge about hazards limiting the opportunities for redevelopment of such areas as well as applies the current know-how and attempts to implement the best administrative practices in the field.

Next to projects such as MAGIC (funded by INTERREG III B CADSES), Olsztyn generates its own studies and activities in local scale that allowed safe and informed redevelopment of the areas of a number of former military garrisons as well as old, depreciated areas of municipal infrastructure such as closed sewage collection site, old brickyard and other.

A significant proportion of areas for redevelopment within the city limits are former military grounds such as former barracks, cavalry detachment barracks, shooting range in the Municipal Forest and military training grounds representing in total over 200 ha of land.

As a consequence of the current status of

those areas and the investment needs of Olsztyn, the municipal authorities have drafted the Local Program of Revitalization of Former Military Areas containing, among others the:

- characteristics and description of the current status of the analyzed areas,
- conditions of revitalization for those areas as concerns environment protection, taking into account the necessity of land studies and development of its cleaning/reclamation plan.

The developers, prior to obtaining the building permits for housing or industrial construction must satisfy the requirements formulated by the Municipality including performance of the study of the land and, if required, cleaning.

Some areas require relatively low levels of outlays on studies concerning potential contaminations and such works are of almost routine type, e.g. in case of old filling stations. But there are also locations where, as a consequence of former, environment unfriendly industrial technology and very complex geological structure, comprehensive and extensive studies taking a number of years are necessary. An example here is the area of formed, already demolished, municipal gasworks situated almost in the center of the town, roughly 300 meters from the monumental old town area.

The policy of Olsztyn Municipality concerning recycling of land aims not only at determining safe conditions of investing in the city but also expanding the knowledge on hazards that extend beyond individual real properties. That applies mainly to identification of underground waters contamination sources. Olsztyn with 174,000 residents possesses three large underground water intake units. Postglacial geology causes that the circulation of water in hydrosphere is relatively short. That requires special care of the quality of drinking water (monitoring of contaminations, fast reaction to emergencies, spillages, etc., control of cleaning effectiveness, frequent monitoring of intakes, maintaining limited utilization areas in the water intakes protective areas).

Integrated municipal areas management (including the requirement of studies and control of geochemical status of soil) should support the perception of security among the residents hence the principles of that management must be transparent and permanent for present and future, small and large investors. At the same time protection of natural richness in the region (the so-called Green Lungs of Poland) is of supreme importance, which results in obvious limitations in the use of areas outside towns and excluded the technologies, which are unfriendly and arduous for the environment.

The current legal situation and lack of clearly defined sources of financing for the works required is the fundamental limitation in processes of preparing and implementing the cleaning operations at former industrial as well as post-military areas.

Offering new, virgin suburban areas to investors is a planning error. Particularly in the situation when abandoned and unused industrial areas are available. The Municipality should create conditions for settlement of ownership issues to allow acquisition of former industrial land by a new investor without problems. The criteria for the new owners of such areas, as e.g. what requires controlling as concerns the environment status, must be formulated. Currently quality standards for soil and earth are in force in Poland. There are still no quality standards for underground waters (although standards for potable waters have been in existence for years). Urgent implementation of the Framework Water Directive into the Polish law is necessary so that the administration could enforce the law in case of exceeding the environmental limits and standards.

Already now, without those guidelines, reasonable and longsighted policy of the municipality concerning environment protection can force the land buyer or investor to install a number of piezometers or to carry out control studies of underground waters. Examples of studies of post-industrial areas where significant contamination of underground waters expanding beyond the borders of the specific real property occurred are very helpful in administrative practice. Projects INCORE, MAGIC and PROMOTE are among such projects implemented in Poland and financed from the European Union funds.

Concluding, the need for methodical, appropriate studies and recycling of former industrial areas in Poland increases as o consequence of:

- liquidation of factories, particularly based on arduous technologies,
- changes in urban development of towns and liquidation of industrial neighborhoods,
- decreasing areas of factories as a result of changes in production profile and willingness to dispose of a part of land,
- increasing demand for land at good locations and with good infrastructure (transport, networks) for non-industrial development (offices, commercial centers, housing),
- general changes in legal regulations (land quality standards), compulsory elaboration of lists of degraded areas at the intermediate level of administration,
- changes in ecological awareness of citizens.

Redevelopment of former industrial areas requires:

- determination and consequence of policy at the local level,
- uniform, certified research methodology (strategy of studies, professional sampling and analyses in accredited laboratories, monitoring),
- honest, controlled remedying the area (appropriate selection of methods, post-implementation control, monitoring).

Administration is expecting support of scientific institutions and experts, effective mechanisms of selecting contractors for remedying works, public support and funds for the purpose.

5.6 Non-viable brownfield sites and the potentials of urban-industrial woodlands in the Ruhr

Martin Franz, Orhan Güleş, Gisela Prey

ABSTRACT

Depending on location, size and former use, brownfields in the Ruhr have different potentials. Besides areas in categories A and B of CABERNET classification of brownfield management, there are many areas in category C (and D as new category for non-viable sites) which are not attractive for the market. One type of use for category C and D is post-industrial nature (e. g. urban-industrial woodlands). Following the overall concept of sustainable development, these sites offer potentials for creative 'place-making' by local residents. The approach of 'place-making' is embedded in the discussion of establishing structures of local governance in urban districts in the Ruhr. Besides introducing one best-practice-case (urban-industrial woodland Rheinelbe), the paper focuses on the discussion of 'place-making' as an strategy for innovative brownfield regeneration and local governance using the example of the former Lohberg colliery.

Introduction

Structural change in the Ruhr takes place under conditions of demographic shrinking and suburbanisation. A loss of 374.000 inhabitants is forecasted between the years 2000 and 2015 (Strohmeier et al. 2002, p. 1). This tends to result in a weak real estate market and a perforated urban structure, in which not every terminated use of a site can be compensated by a new profitable project.

Depending on location, size and former use, brownfield sites in the Ruhr have different development potentials. One type of (temporary) use for brownfield sites is post-industrial nature, e. g. urban-industrial woodlands. Such sites represent new places for recreation and experiencing nature.

Following the overall concept of sustainable development, the former industrial sites offer potentials for creative processes of 'place-making' by local residents in the Ruhr. The strategy of 'place-making' (as collective adoption and designing of own environment by the residents) has the potential to play a central role in the integration of their social spaces. The concept of 'place-making' (de Magalhães et al. 2002, p. 53) is embedded in the discussion of establishing sustainable structures of local governance in the urban districts of the Ruhr. Surveys and workshops with residents in these urban districts have shown that they want to participate actively in the planning and realisation of concepts for the further use of brownfield sites.

Besides investigating the actual market situation for brownfields in the Ruhr and discussing one best-practice-example of urban-industrial woodlands, the former Rheinelbe colliery in Gelsenkirchen, the paper focuses on the discussion of future

perspectives for 'place-making' as an approach for innovative brownfield regeneration and local governance using the example of the former Lohberg colliery in Dinslaken. Furthermore it emphasises that even for non-viable sites an integrated and strategic land management is needed.

The paper is based on literature analysis and a series of qualitative interviews. It considers results of research projects the authors have been involved in since 2004.

Structural change in the Ruhr and the market situation for brownfields

The situation for the marketing of properties in the Ruhr has changed dramatically over the last decades. The sales of land have declined strongly. This happens under conditions of a weak economic situation, suburbanisation and demographic shrinking and the shifting of growth industries, e.g. information and communication or biotechnology, into regions which were not occupied by the 'old industries' (e. g. steel production) (Häußermann, Siebel 1987, p. 64).

Structural change in the Ruhr

The structural change in the Ruhr, generated by the decline of the 'old industries', has resulted in high rates of unemployment and a shrinking population. Coexistence of growth, stagnation and shrinking leads to a perforation of the urban landscape. Processes of polarisation and fragmentation accumulate, especially with the concentration of certain population groups (e. g. migrants) in some urban districts. These developments tend to a declining local tax base, turnover of real estate values. In addition, depreciation leads to a loss of retail in these urban districts. Examples are the urban districts of Bismarck, Schalke-Nord and Ückendorf in Gelsenkirchen (Hohn, Keil 2006).

A shrinking population leads to high vacancy rates. The loss of quality in local infrastructure, e. g. leisure and cultural amenities (like the closing of public swimming pools or libraries), leads to a further decline of attractiveness and thus out-migration. However, actors of urban and regional development – both in the private and in the public sector – still use planning instruments and policies which were developed under and for conditions of growth.

Market situation

The large enterprises and business groups at the real estate market react very differently in this situation. Under the pressure of globalising markets more and more land owners aim to have a value creation in their real estate portfolio through portfolio-management and corporate real estate management (CREM). Because of the extent of the real estate portfolio, decisions to sell or develop certain areas have a bearing on the spatial development of the regions concerned. The intention is, on the one hand, to reduce the holding costs of the properties and, on the other, to generate a cash-flow for the core business. This is true for both residential and commercial properties and also for brownfield sites owned by private companies (Butzin et al. 2006, p. 263).

In the federal state of North Rhine-Westphalia (NRW), to which the Ruhr belongs, a number of enterprises are active in the marketing of brownfield sites, for example:

- the Landesentwicklungsgesellschaft NRW (LEG NRW), a state-owned development company of NRW,
- the g.e.b.b, a company owned by the Federal Ministry of Defence (BMVg) that sells unused properties of the armed forces, or
- the BahnflächenEntwicklungsGesellschaft NRW mbH (BEG), developer of former railway land.

Together these state-owned companies

hold sites of about 3,400 ha in total (Butzin et al. 2006, p. 264). The biggest supplier of land in the Ruhr is the Montan-Grundstücksgesellschaft (MGG), a subsidiary of the Ruhrkohle AG (RAG AG). The RAG AG owns all hard coal mines in Germany. The MGG manages sites of 16,000 ha in the Ruhr and in the federal state of Saarland. Approximately 1,100 ha presently are under redevelopment. For another 1,000 ha, the development potentials are currently evaluated. MGG sites are spread out over the Ruhr in 46 locations and 25 different municipalities (Butzin et al. 2006, p. 264).

The volume of land sales in Germany decreased in the 1990s. While more than 28,000 ha were sold 1993, so that only 9,000 ha were sold in 2004. This is a reduction of almost 70% (Statistisches Bundesamt 2006). Thus, a steady increase of the land supply can be proved. Moreover, the composition of the land suppliers has changed strongly: While the LEG NRW and the MGG played the major role in the land market in the Ruhr in 1993, suppliers today diversified into various enterprises which belonged not originally to the real estate market. This includes the Deutsche Bahn (German Railways), the Deutsche Telekom (German Telecommunications) and regional economic development agencies.

Furthermore small municipalities at the periphery of the region still develop new industrial parks on greenfield sites – often with public subsidies. This leads to further reduces of demand for brownfield sites in the urban centres. While 8,544 ha in 2001 – this is 1,9% of the whole region – were brownfield sites (Dransfeld et al. 2002, p. 26) the settlement and traffic area grew at the expense of free areas by 11,660 ha between 1990 and 2004. This growth was particularly strong at the northern and eastern edges of the Ruhr (Recklinghausen, Unna and Wesel) which are the most important target areas of suburbanisation (RVR 2006, p. 14).

Despite the low demand, expectations of local authorities concerning new developments on brownfield sites were inflated. Especially the big brownfield sites in the Ruhr cities were assumed to be the ‚chance of the century for the urban development' within the last 15 years. It was expected that they have the potential to give new impulses for the economic, social and ecological development of the region. This chance was used – sometimes more, sometimes less successfully – by the IBA Emscher Park (International Building Exhibition Emscher Park) and local authorities. The ten-year IBA Emscher Park programme was based on a structural development concept with the objective of providing a strong impulse to the northern part of the Ruhr and ran from 1989 to 1999.

Examples from different cities of the region show how the cities in the Ruhr tried to give new impulses for their economic, social and ecological development:

- Shopping centres: The CentrO in Oberhausen, opened in 1996, is the biggest shopping and leisure centre in the Ruhr and includes over 200 national and international shops. Furthermore, a 400 m long promenade with restaurants and bars, 10,500 free parking spaces, a marina and a multi-purpose arena are all part of this new development in Oberhausen on the site of a former steel works.

- Technology cluster: The new MST. factory Dortmund on the former Phoenix West steel works site is the starting point of a microsystem technology cluster (MST). This regional micro- and nanotechnology cluster consists of 33 companies.

- Recreation: The Landschaftspark Duisburg-Nord (Duisburg-Nord Country Park) – a former mining and steelworks site – was opened in 1994 and has since developed into a popular tourist destination for natural, cultural and sports-related

leisure pursuits.

- Culture: The world heritage site Zeche Zollverein (Zollverein colliery) shaft 12 in Essen-Katernberg has been turned into a centre for culture and design since 1986, aiming to attract creative enterprises.

These flagship projects of brownfield redevelopment have one thing in common: all developments were based on significant public subsidies. This leads to the question whether such subsidies are needed for all brownfield projects.

Especially in old industrial regions brownfields are often economically marginally viable or even non-viable sites. Compared with greenfield sites they are not competitive without public intervention (Thornton et al. 2005, p. 60). However, "one major engine driving the reclamation of land is obvious – profit" (Groundwork 1999, p. 8). In many cases in Europe the location and condition of the site and the state of the real estate market make it economically viable to develop a site without public subsidies. But such projects are situated in growth regions and / or at really outstanding locations, which are attractive for international investors (Groundwork 1999, p. 8; Ganser 2006, p. 56). Examples for this can be found in growth regions all over Europe – in London, Munich or Helsinki. In growing metropolitan regions market mechanisms solve the brownfield problem relatively quickly through high or increasing real estate prices. But where is no demand for a site, an investing into regeneration will not pay off. What then remains is the intervention of the public sector.

Classification of brownfields

In 2005 CABERNET published the ABC-Model (Millar et al. 2005, p. 240f.) as a typecast of brownfield sites (Figure 1). This model is a further development of a model published by Ferber (1997, p. 36). The three types are differentiated in relation to their economic status and funding:

- „A Sites: these represent development projects that are driven by private funding
- B Sites: these projects are characterised as being on the borderline of profitability. These projects tend to be funded through public-private co-operation or partnerships
- C Sites: these projects represent mainly public sector or municipality projects driven by public funding or specific legislative instruments (e.g. tax incentives)" (CABERNET 2005).

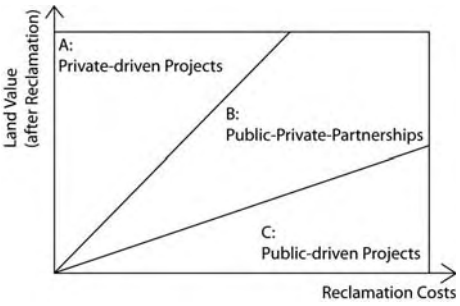

Figure 1: ABC-Model
(Source: CABERNET 2005)

Under conditions of shrinking a further category D can be identified (Figure 2): Sites where no redevelopment takes place, because neither the private sector nor the public sector want – or are able – to invest in the site (Butzin et al. 2006, p. 265).

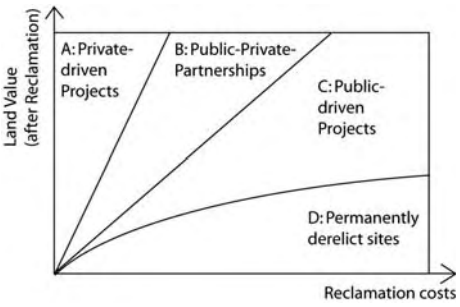

Figure 2: ABCD-Model
(Source: compiled by the authors based on Butzin et al. 2006, p. 266)

Examples for category A in the Ruhr are mostly logistics and retail locations (e.g. IKEA in Duisburg). In a number of other projects (the collieries Ewald in Herten, Prinz Leopold in Dortmund and Niederberg in Neukirchen-Vluyn) are examples in which only the planning phases were subsidised, but not the actual implementation of the projects. However, these projects are not properly category A sites but borderline A to B sites.

Type B includes a number of industrial parks and retail developments in the Ruhr. They have been subsidised with the aim to create new jobs. Not all of these projects have been a success. Some 19% of the sites in industrial parks in the Ruhr are vacant (ILS 2005, p. 21).

Type C usually consists of leisure and culture projects which remain public property or are managed by the public hand. Examples are:

- Urban Parks like the Duisburg-Nord Country Park (City of Duisburg and LEG NRW), the horticultural show in Osterfeld (City of Oberhausen and MGG), the Consol-Park in Gelsenkirchen (City of Gelsenkirchen and MGG), the Nordstern Park Gelsenkirchen (City of Gelsenkirchen), the municipal park West in Bochum (City of Bochum and LEG NRW), the urban district park Recklinghausen (regional agency RVR and the Förderverein Bergbau und Industriegeschichte (local association for industrial heritage)) or the municipal park Prosper III (City of Bottrop and MGG) (Dransfeld et al. 2002, p. 85-86).
- Urban-industrial woodlands like the former collieries Rheinelbe, Alma, Graf Bismarck and the coking plants Zollverein in Essen and Hansa in Dortmund as well as the chemical plant Chemische Schalke in Gelsenkirchen (for a detailed overview on urban-industrial woodlands in the Ruhr area cf. Dettmar 2005, p. 270 and Landesbetrieb Wald und Holz NRW, Forstamt Recklinghausen 2006).
- Slagheaps like the tetrahedron (RVR, City of Bottrop, RAG AG), Schwerin (City of Castrop-Rauxel) or Schurenbach in Essen (regional agency RVR, RAG AG).

One brownfield can include different parts of various categories. For example: The Duisburg-Nord Country Park is a C site from which a part was separated for the development of an IKEA complex. The transformation of a C site (or parts of it) into a B site is a process, during which the site gets progressively more attractive and more interesting for investors. An example is Rheinelbe where the development of an urban-industrial woodland has led to the later development of parts of the area to a call centre by a private investor.

Such urban-industrial woodlands were initially planned as a temporary use with the option to later redevelop these sites for other uses. Thus, the urban-industrial woodlands are a classic intermediate use, which are becoming more important under conditions of shrinking regions. However, while urban-industrial woodlands are a controlled intermediate use, there are also many sites, where nature simply invades and recaptures brownfields. Neither the private nor the public sector show any interest in such sites. They belong into category D and remain like 'holes in the urban fabric'. Examples can be found at the sites of the former Flottmann factory in Herne or the former port Pöppinghausen in Castrop-Rauxel.

Urban-industrial woodlands in the Ruhr

The urban-industrial woodlands in category C and D are widely dispersed in the Ruhr. As 'post-industrial nature' these "new wild woodlands" (Keil 2005, p. 117) offer a development potential for flora and fauna more than any other type of urban land use in the region. Urban-industrial

woodlands are a result of the spontaneous natural colonisation on brownfields and are characterised by a high diversity of species (Weiss 2003, p. 55f.). The importance of abandoned industrial land as valuable habitat for plants and animals has been shown in several studies (Dettmar 1992 and 2005; Dettmar, Rebele 1996).

Besides this important ecological aspect, the new woodlands offer great potential for new nature experiences and leisure and recreation activities for local people. Different to the planned and cultivated urban parks (like the GRUGA Park in Essen), in the new urban-industrial woodlands visitors get an idea of 'wilderness'.

Project Industrial Forests Ruhr Region

The urban-industrial woodlands are under the administration of the "Projekt Industriewald Ruhrgebiet" (Project Industrial Forests Ruhr Region), jointly run by the LEG NRW and the forestry administration NRW. The project was founded in 2002, after transferring the "Restflächenprojekt" (Remaning Areas Project) to the forestry administration NRW to become a permanent project. The Remaning Areas Project was initiated by the IBA Emscher Park in 1995 and passed a trial period of six years. Since then, the Forestry Office Recklinghausen manages and coordinates this project. Besides the main purpose of the project to improve converting further brownfield sites into forests through natural colonisation, one aim of the project is the accessibility, use and adoption of the urban-industrial woodlands by the local population in the adjoining urban districts (Landesbetrieb Wald und Holz NRW, Forstamt Recklinghausen 2006).

Social functions of urban-industrial woodlands

To realise this aim and to identify the social functions of the urban-industrial woodlands for the local residents in the adjoining urban districts, the forestry administration funded several social geographic field studies, focusing on different age and population groups (children, adolescents, adults and Turkish migrants) (Keil 1997; Findel et al. 2003; Hohn, Keil 2006). All studies had a common focus in the analysis of the perception, use and adoption of urban-industrial woodlands by local residents. Different qualitative and quantitative methods were used. While Keil (1997) and Findel et al. (2003) used observation methods and compiled maps of the selected study areas, Hohn and Keil (2006) used part-standardised interviews with Turkish migrants and in-depth interviews key actors in the studied urban districts as the main data source for their study on "Turkish migrants and urban nature". This study was realised under participation of two of the authors of this paper, Orhan Güles and Gisela Prey.

Keil (2002 and 2005) has pointed out several social functions of the urban-industrial woodlands in the Ruhr. In many ways they are used as additional inner-urban open space, as urban adventure sites for children and as recreation areas for adults. His studies confirmed that the natural and structural heterogeneity of urban-industrial woodlands in particular attract children and young people and stimulate them to use the areas in different and creative ways. His observations showed that the children were engaged in various play activities (for detailed data cf. Keil 2005 p. 120 and p. 123). Besides typical play activities like hide-and-seek, playing ball or building tree houses they also played games which were adapted to the particular structure of the area (like climbing bunkers).

The results of these studies indicate that the use and adoption of the urban-industrial woodlands has increased since beginning of the project in 1995. The first site in the Remaining Areas Project was the urban-industrial woodland Rheinelbe in Gelsenkirchen, and this pilot project has become a particularly important leisure and recreation area for local residents and a place for different age and

population groups to experience nature (cf. Keil 2005 p. 120 and p. 123).

It is important to note in this context that the urban-industrial woodland Rheinelbe borders on the Gelsenkirchen district of Ückendorf, which is characterised by high residential vacancy rates, decline of the local tax base, a decline of local retail activities and the loss of quality in local infrastructure (Hohn, Keil 2006, p. 29f.). In 2004 the unemployment rate was 25%. In the northern part of Ückendorf commercial vacancy rates were as high as 40% in 2003 (WohnBund-Beratung NRW 2003, p. 14).

Between 1997 and 2003 leisure activities of adults increased in 2003, while children's play and adolescents' activities decreased (cf. Keil 2005, p. 123). In 2003 adults used the Rheinelbe area in 2003 mostly for walking (24% of all activities), bicycling (27%) and walking the dog (17%). The studies show that the urban-industrial woodlands have developed into established and accepted green places and have shaped the post-industrial urban landscape of the Ruhr.

Hohn and Keil (2006) have also shown that Rheinelbe is well accepted by the local residents in Ückendorf. This was reflected in the frequency of visits by the interviewed Turkish migrants. More than 80% of them declared that they visit this area. The two other urban-industrial woodlands in the study were visited far less frequently, Graf Bismarck in Gelsenkirchen by about 40% and Hansa in Dortmund by just about 20% of the Turkish migrants from the surrounding areas.

The most popular kind of activity for Turkish migrants in all three study areas was walking, especially on weekends with the family. Other activities were mainly sporting in nature (bicycling, jogging or playing general) and also 'meeting friends' (Figure 3).

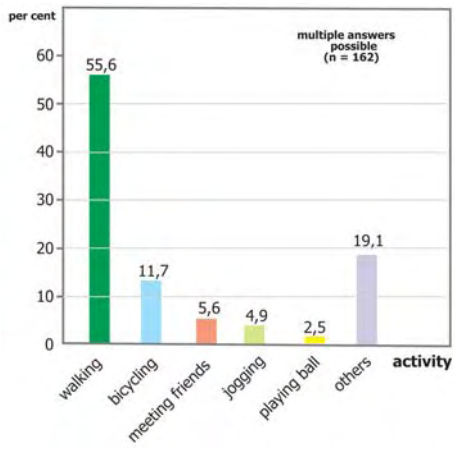

Figure 3: Activities of Turkish migrants in urban-industrial woodlands
(Source: Hohn, Keil 2006, p. 66).

Place-making as an approach for innovative brownfield regeneration

For a sustainable and innovative development of brownfields a greater integration of the interests and wishes of all local population groups is necessary. This is also important for the embedding of these areas in the life spaces of the local residents. The integration of different interests should consider age, gender and the migration background of all local residents.

The population in the vicinities of the analysed urban-industrial woodlands has shown an interest in realising their ideas creatively and actively (Hohn, Keil 2006, p. 113). Therefore, open spaces for such an active adoption of all local residents should be created. Brownfields of the categories C and particularly D offer an opportunity to counteract the lack of open spaces in the neighbouring urban districts with high proportions of migrants. If there exist no redevelopment interests or demands in such areas and they are located conveniently, they should be opened for the continuous or temporary use by the local population. Of course, this decision must be based on a risk assessment concerning potential contaminations.

Opening of a site for the public should be accompanied by a transparent risk communication and a concept of collective adoption ('place-making').

Place-making and local governance

Fürst et al. (2004, p. 38) explain 'place-making' as a collective process of space arrangement with the aim to advance the usage and living quality [of a space] and to adopt the space in a socio-emotional way. Decisive for place-making are the space effects of the activities of the residents, their participation in planning and realisation, their personal engagement and particularly their motivation to improve the quality of life on their surrounding 'space' to create their own 'place'. Place-making processes (de Magalhães et al. 2002, p. 53f.) as active adoption processes open up the chance for a stronger identification with one's own living place.

The approach of place-making is embedded in the current debates on governance. Governance at the urban and local scale (as (new) urban governance and local governance respectively) is thus a function of the collective and institutionally anchored regulation of urban development processes. Therefore, different actors (like businesses, public authorities and NPOs) are all involved in urban development in formal and informal, flexible and enduring networks. "In this context, (new urban) Governance is a constitutive element of a changing planning culture, characterised by stronger cooperative, communicative, dialogical and competitive components in regulation and control processes" (Hohn, Neuer 2006, p. 293).

For solving the multiple problems of urban districts in a old-industrial region like the Ruhr, cooperative forms of urban development are required which integrate the interests and capacities of the local residents as actors of the civil society. The aim is to develop institutional capacity and create an engaged civil society in these urban districts so that the residents actively participate in the development processes. Place-making can then be one activating strategy to develop and advance new structures of local governance in the local community.

Place-making for innovative brownfield regeneration

To realise this aim a research team from the Ruhr-University of Bochum has developed a model project approach for the urban district of Lohberg in Dinslaken. In their project, residents will be given the opportunity to develop plans for parts of the area of the former Lohberg colliery (closed 2005). Aims of the project are the creative redesigning and self-determined adoption of these parts through the local residents.

As a disadvantaged district with multiple problems, Lohberg has been a project area of the federal state programme "Soziale Stadt NRW" (Socially Integrative City NRW) since 1999. The programme is based on an integrated development concept and intends to establish sustainable structures of local governance in the participating project areas. The planned approach follows up this process of local governance in Lohberg.

The planning and realisation processes will be accompanied and moderated by the project team. For the realisation of the project the researchers have developed three possible place-making modules: "Wood of Cultures", "Wood of Generations" and the "Neighbourhood Wood" – the latter being a modern variant of the traditional "common land". These modules take up the problems in the urban district development in Lohberg and should contribute as activities of place-making to the establishment of sustainable resident-supported structures of local governance.

Conclusions

This paper has pointed out that there are many brownfield sites in the Ruhr in categories C and D which are non-viable for the market. Most of the brownfields be-

longing to category A or B have found a new economic use. The supply of brownfields is much bigger than the demand, hence the brownfield market in the Ruhr is a weak real estate market. This tends to result in a perforated spatial urban structure.

One successfully tested (temporary) use for C- and D-brownfield sites is the different forms of post-industrial nature, e. g. urban-industrial woodlands. The 'Industrial Forest Ruhr Region' project has developed a way to give brownfields a new use accepted by local residents. They use such woodlands as new places for experiencing nature, for leisure and recreation, and hence integrate them in their life spaces. Especially the urban-industrial woodland Rheinelbe has developed into an area which not only has ecological functions but which also fulfills social functions for the local residents. It is advisable to learn from this example and to transform more brownfields into areas of post-industrial nature to prevent the spatially urban structure from perforation.

It is to expect that in the context of structural change, demographic and economic shrinking and heavily indebted municipalities the number of sites falling into this categories C and D will increase in the future, not only in the Ruhr but also in other old industrial regions in Europe. One task of strategic land management would be to direct possible land uses to such sites. A strategic land management should combine planning instruments, applicable at particular spatial scales (local-urban-regional). It is obvious that such a system of strategic land management should be implemented at the level of the regional development agency. This management system should connect a sound conceptual basis for regional development with regional co-operation and translate them into action. It should follow a strategy of regionalisation, inter-municipal co-operation and the concentration of activities of the public hand at the level of the region. When ever a decision is taken to leave a site for the development of urban-industrial woodlands, this can be embedded in a place-making process. The realisisation of place-making projects at the local level and the monitoring of this development can support the development of overall strategies at the regional level. Placemaking as a local strategy can be possibly one of the modules for a new future strategy to handle the perforated spatial urban structure of the Ruhr. It should be part of a extended strategic land management system, which Butzin et al. (2006, S. p. 267f.) have named "patchwork-management".

As a strategy for establishing local governance place-making can get new confident in the creating of the social capacities of the local residents. The empirical surveys and workshops with the residents have shown that those want to participate actively in the planning and realisation of concepts for the further use of brownfield sites. Therefore, in the absence of economic pressure, brownfields of categories C and D should be turned into open spaces for an active adoption by the residents to develop them for new public and non-commercial uses.

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5.7 The "Green Brownfield Approach" – An Example for an interim use

René Otparlik, Herbert Klapperich, Erich Fritz, Alexander Eisenblätter, Michael Hanke

ABSTRACT

The "Green Bownfield Approach" can be interpreted like activities to promote and stimulate the realisation of Brownfield redevelopment activities. These actions can't be seen in a specific regional context. This means activities in the inner city development and also for landscaping of former mining sites. The reusing of contaminated land or Brownfields sites for renewable energy is one concept. Not all sites have a final "reusing model" at the beginning, which can be solved at once. The most serious problem is the strategy how to manage a site. This paper presents an example of a reusing concept, how to solve actual problems and manage a social economic upgrade of a site and a city district. This approach is one of the typical CiF intentions to address the interest of all stakeholders in urban development and the potential role of the remediation of Brownfields in this concept.

Introduction

In today's discussion there is a strong talking about sustainability in context of reduction of Brownfield sites. When we start looking at this we do have to think about the basics of the word sustainability, which is first known in the beginning of the 18th century (Sylvicultura oeconomica: Hans Carl von Carlowitz (1713)). Although this beginning aspect was founded in the forestry for mining usage, one kind of site management was defined. This very old discussion about reusing former used land is today also up to date, because today we talk about the "real estate circle" and the remediation of used sites, Brownfields. The difference between former times and today is the very high request in space and other natural resources, everywhere in the world. One reason is of course the higher prosperity than 40 years ago, because an own house in the "green" is often a goal. But consider the means of sustainability, in the period between 1960 and 1997 we have a high increase of the settlement and traffic areas, but only a small expansion of population level, which is in the remaining decade relatively constant.

By using remediation technologies mostly former used land can be recreated to "green". The main result of these recycling processes in combination with pollution and contamination reduction processes are the reintegration of a site in the landscape.

A lot of Best-Practice-Examples have been shown, it's the best to combine all three or better four aspects, which have to be solved from the beginning:

The technical and ecological, the legal and the economic aspect.

In "Green Brownfield Approach" of CiF e.V. all these aspects are combined and applied in all projects which have to be solved. The SAXONIA GmbH in Freiberg has a lot of best-practice examples which show that the combination of site development and resettlement is possible with positive aspects.

These aspects mentioned above will now be shown on a small example of a site in Freiberg, Germany.

Background

There are different steps in developing a site or brownfield site. Most sites are catalogued in land register, Brownfield register or contaminated site register. In theses registers the basic information are outlined. But not all sites which are catalogued are priority sites. In CABERNET European research project (Concerted Action on Brownfield and Economic Regeneration Network) three types of sites: A (self-development-sites), B (potential development sites) and C (reserve sites) were developed. But all of these types can be used in different ways in the overall city development. They have to be filtered and more information of a site has to be collected. This may be realised e.g. with the "Site-Passport" ("Flächenpass"), developed by CiF e. V. in a research project for the German Federal Environment Agency (Umweltbundesamt). After all information is compiled the planer has to decide if a site can be reused, a interim use is possible or at last but not least is it may be easier to renaturate the site.

Legal Aspect

The most serious problem is the undefined or not totally clearly defined legal situation on a site. Our example site is called "Kühlerbau" Freiberg (cooler were built there). It is located in the outer south of the older housing area and at the beginning of the residential area "Wasserberg". Since 1935 first cooler and later on chiller were produced there until it's shifting in the middle of the 1990´s. The building was given back to the former owners, without managing the site development in the following years. The "Brownfield" characteristics like ailing building substance leads to a real estate with high potential risks. In compulsory auction the SAXONIA GmbH bought this site in 2003.

Figure 1: „Kühlerbau" in 1990

It's obvious that this example can be transported to every other site, too. A lot of Brownfield sites can't be reused because of the conflict of the owners, although the site is located in very attractive location near to the down town of Freiberg. In the context of the new European soil protection act, soil need to be prevented of further degradation. So, all legal possibilities have to be used to solve "green fields" for the future. All in all there are three strategies for a revitalisation: activation (development), conservation and renaturation. Most private investors prefer a reactivation of a site in a "flexible way" to solve chances for reuse.

Technical and ecological aspect

Although there are still some aspects mentioned above, in remediation processes lots of different technical and ecological aspects are relevant. Technical instruments and methods are used to improve the ecological "activity" of the site and the impact in landscape. In this context other cleanup strategies with innovative techniques are taken into account for replacing e.g. the cost intensive "pump and treat" regarding groundwater cleanup.

But not every technique may be suitable. In our example there is no acute danger. So based on the situation and location of the site, which is situated in a residential area, the former industrial usage can't be continued. In 2004 the SAXONIA GmbH decided the demolition of the buildings and facilities. The restructured site has now gravels and planting vegetation on the top.

In the last decades a lot of different methods have been developed, mostly to improve the ecological "activity" of the site. In this context a lot of networks were created to develop overalls solutions. CiF e.V. is member in some of these national and international working networks.

In today's policies and discussions sustainability and reusing of Brownfield sites are almost called in the same context. If we look for the international networks like CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies in Europe) or CABERNET we found a lot of existing concepts for remediation Brownfield sites. Not all sites are focussing on a "reusing model" which can be solved at once. Often a site managing strategy is missing. A concept of reuse shows, how to solve actual problems and manage a social economic upgrade of a site and a city district.

Figure 2: Revitalisation Activities

So contamination of a site is mostly the biggest problem of reintegration in the surrounding. But its statistically proofed that only 14 % of all Brownfields are contaminated and only 4 % of those still have developing problems. The biggest problems in developing sites are feasibility in financial matters and current market conditions. Neither the different financial expectations of the owner and investor and legal restrictions are to be disregarded. But never the less the contamination of a site is still a marketing problem. Using "green fields" is mostly much easier, however not befifical in the overall view.

Economic Aspect

The economical issue is focussed on the real financing aspects of Brownfields and "Green-fields" in comparison. Most investors want to have a site with the best conditions, so local authorities created shopping malls in the surrounding of towns in the early 1990th. This seemed to be cheaper than the revitalisation of former used or contaminated Brownfields. The real costs for infrastructure, which is already present on a Brownfield site, and other realistic costs are mostly not estimated in the comparison between the overall costs of "green field sites" and Brownfield sites. Once again back to the classification into A, B or C sites. A and B sites (Self-development Sites and potential development sites) are mostly sites, without big developing problems or are developed under public-private-partnership models. The biggest problems in developing sites are feasibility in financial matters and current market conditions. Under the background of a decreasing population e.g. in Eastern Germany some new or more efficient financing models have to the invented, to develop or renaturate the C-sites. When a future concept exists like in our example an interim use however is useful.

The new existing free space will be

Figure 3: Interim Usage

perceptively used as a building site, because of the declaration as residential zone in the city-development plan of Freiberg. According to less parking space in this area the confirmed front part (see figure 3), is now in use for parking. The part behind can also be used for parking if there are some events in the gymnasium nearby. Both sites are now under interim usage, but can very quickly be used for another purpose if there are new demands

Options and Visions

The site is located in a city area with high developing potentials. It's directly connected to the historical town and some characteristic elements of the city district and the town are located there. Although this description sounds very regularly, there are still some elements of undefined space, building sites and barriers, which are counterproductive against the harmonic everyday life in the housing area. But there are still potentials for restructuring the planned area, with the result to integrate the site harmonically into the residential area and the urban structure by creating new potentials for the prospective in living future and an integration of the inhabitants.

There are still some scenarios which have been created in cooperation of the SAXONIA GmbH and students from the TU Dresden Institute of Regional planning. These ideas called "New Middle Wasserberg" show the potentials to integrate this city district in an active city management developing process. The goal is the method of using these inner city sites in an "intelligent and sustainable" way, however the dominant usage of this former industrial used site is housing and recreation. This also integrates service, sports and spare time scenarios in the further discussions.

In figure 4 the ideas for housing and recreation were picked up and a precise proposal with city development conception ideas was developed. The city creation plan shows many single activities, a reassessment and enhancement of the spatial functional combination of the building, constructions and infrastructure can take place. On closer examinations this planning will give this city district a distinctively

Figure 4: Alternative urban development concept

character in the city complex, because after this revitalisation in this district recreation, sports and housing is combined at the same place, which was in former times an industrial site with high socio-economic conflict. On the Basis of the development concept five partners are combined to develop the site to a high class living area. The concept is mentioned in figure 5.

The 2 to 3 floor houses will be integrated into the existing context harmonically.

Figure 5: Developing concept

Final remarks

It's obvious that all stakeholders are involved in this interdisciplinary approach. An example for this approach was accomplished by CiF e.V., in cooperation with SAXONIA GmbH and Stadt + Entwicklung Leipzig, in an international project within the establishment of a sustainable site management concept for the "Small Triangle". (Zittau (D), Hrádek nad Nisou (CZ) and Bogatynia (PL))

But often the redevelopment process can't be completed at once, so several steps of revitalisation are useful, for example temporary activities.

The modern urban planning and management has to focus on the socio-economic improvement of the surrounding and at the same time to enhance socio-cultural possibilities of such sites.

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5.8 (Costs and) Benefits of High Quality Landscape on Commercial Areas on Brownfield Land in the Ruhr area

Bernd Mielke

ABSTRACT

The redevelopment of brownfields into business parks with a high landscape quality is an important policy to overcome the structural crisis of the Ruhr area. But given the tight public budgets the question arises if the money is well invested. The presentation discusses methodological questions and gives empirical evidence for some of the benefits of landscape measures on commercial areas.

Introduction

In a world with global competition an attractive setting for investment becomes more and more crucial for regional development. Within this context the revitalisation of brownfields is playing an important role. Landscape measures can enhance the appeal of a site and moreover the attractiveness of the local environment. On the other hand there is an increasing pressure to prove that all measures of a brownfield redevelopment project are necessary and useful. This is why economic tools and the assessment of the costs and the benefits of a project become more and more important. Due to time restrictions this presentation is confined to the benefits.

The analysis is a module of the Interreg IIIB-project "Creating a Setting for Investment" (CSI) which is aiming to assess the link between landscape measures and investment decisions in the context of the redevelopment of brownfields. It addresses not the whole process of brownfield redevelopment projects but deals only with the impact of high quality landscape of commercial areas on brownfield land. The questions are: Does a high landscape quality of commercial areas which are developed on brownfields

- reduce the need for public funding (making development projects more profitable) or
- is it justified by external effects?

Partners of the CSI-project are investment agencies, universities and a state government research institute in England (Yorkshire), Belgium (Walloon Region) and Germany (Ruhr area). The project is funded by the European Commission.

Geographical Background: Structural Change and Regional Policy in the Ruhr area

The Ruhr region is still one of the biggest metropolitan areas in Europe but it has been suffering from structural change and decline for about 40 years. Many problems of the region have been solved in the last decades. The Ruhr area has an excellent infrastructure and fine universities. One remaining problem of the region is the brownfields which originate mainly from the declining coal and steel industry. The revitalisation of brownfields by development of high quality business parks was one of the main objectives of the International Building Exhibition IBA EmscherPark which took place from 1989 to 1999. The main intentions were:

- The reuse of brownfields should stop the consumption of agricultural land for industrial sites.
- Excellent settings should meet the demand of high technology enterprises with R&D activities.
- The lack of public open spaces of surrounding urban areas should be balanced. Therefore often more than 50 % of the sites are used as green areas.

In total 22 projects with an area of 500 ha were implemented. Among others, the IBA-projects are the empirical basis of this study.

Figure 1: Aerial view on the Erin Business Park; Source: LEG (2006)

A typical example of a working in a park project is the redevelopment of the former coal mine Erin in Castrop-Rauxel, a small town north of Dortmund. The area is situated near the city centre.

Analytical Concept

To assess the impact of a project it has to be taken into account what would have happened without the project. Fig. 2 shows that the net impact of a project can be much smaller than the gross impact. Therefore the impact of a redevelopment project with high landscape quality (intervention case) has to be compared with the development of reference cases without landscape measures.

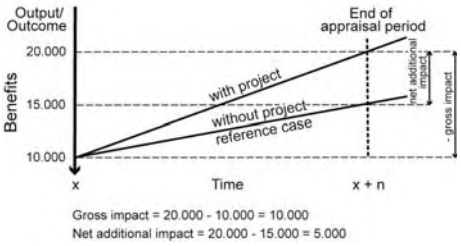

Figure 2: Figure 2 Assessing additionalitySource: Carr et al. (2004)

Intervention cases are brownfield redevelopment projects with a high share of green spaces which are referred to as business parks in the following text. Reference cases can be:

- real reference sites, e.g. other commercial sites without landscape measures but with equal qualities in all other respects or
- fictitious alternatives of the intervention (e.g. a fictitious redevelopment of the intervention site without landscape measures).

This presentation is confined to the comparison of intervention sites and real reference cases. It is nearly impossible however to

find reference sites with equal qualities in all respects besides the landscape quality. But the differences should be as small as possible - therefore retail areas have to be excluded for example. Regarding the remaining differences the impact of the interfering factors has to be assessed. This can be done by

- cross-section analysis, controlling the interfering factors which is difficult because - among others - due to the small number of cases statistical methods cannot be applied or
- time-series analysis - supposing that interfering factors stay constant in the period of investigation.

Additional Benefits due to high Landscape Quality

At first it will be discussed what kinds of benefits of landscape quality on commercial areas can be distinguished and how they can be analysed. After that the results of the empirical analysis will be discussed.

The assessment of the benefits of landscape measures on commercial sites is difficult because a part of the benefits is indirect or intangible, i.e. they cannot be quantified easily. Furthermore the benefits of the intervention have to be reduced by displacement or substitution effects - i.e. reduced output elsewhere in the target area. Beyond benefits of the intervention case can only be calculated by comparison with a reference case which is an additional source of error because suitable reference cases are hard to find.

As a first step direct and indirect benefits are to be distinguished.

Direct benefits

There are mainly five direct benefits of high landscape quality on commercial sites:

- Increase of the land value/quicker selling process
- Gain in flexibility
- Sales revenues for the green spaces
- Saved expenses i.e. if compensation for the deterioration of nature can be carried out by the landscape measures
- Reduction of the nimby effect.

Because of time restrictions only some of them will be discussed.

<u>Increase of the land value/quicker selling process</u>

Enhancement of the landscape quality of a commercial site can cause an increase in the demand for the plots. A commercial area with high landscape quality should be attractive for the firms for several reasons (Verkade 2006):

- An attractive surrounding let customers get a positive impression.
- It can facilitate the recruitment of employees.
- Further on the landscape quality might enhance the health of the employees or motivate them to get better results.

Thus a positive impact of a high landscape quality of a commercial area on land values is plausible. But while there are several studies that analyse the impact of parks on the value of residential property there is no known study for commercial sites.

If commercial sites with a high landscape quality are more attractive for enterprises this might accelerate the selling process of the plots, too. This can be important because the developer is interested in a quick return of his capital. On the other hand most settlements on commercial sites are relocations within the region. Therefore a quicker selling process can be connected with displacement effects elsewhere in the region. In this case the quicker selling process remains positive for the land owner/developer but the net

effect for the region is small at best.

Gain in flexibility by temporary nature

Using green structures as reserve areas for future plant expansions can be conflicting with the interests of other firms or the community and is normally excluded by land use plans. But in the case of the redevelopment of large brownfields sometimes only a part can be reused as a commercial area because there is not enough demand for the whole area. In theses cases in NRW those parts of the area which actually are not to be reused commercially can be declared as temporary nature. Different from permanent green spaces the nature then is seen as an "in between-utilisation" which can be changed into economic land use without planning restrictions.

This strategy is attractive

- for the land owner because the area is graded up by the temporary nature and because he can continue to hope for an economic valuable development
- for the community because the green spaces enhance the quality of environment and
- for the companies because there is a reserve area for future expansions without relocation.

All in all the temporary nature is an important gain in flexibility.

Sales revenues for the green spaces

The green spaces of business parks which are developed on brownfield land in NRW often are sold to the municipality if they are accessible for the public. The municipality then is responsible for the maintenance as well. The sales revenue for the green spaces can cover a (small) part of the redevelopment costs.

Saved expenses

Landscape measures can lead to cost reductions for other sub operations of the site development. This can be regarded as a direct benefit of the landscape measure as well. Two possibilities were used in the Ruhr area mainly:

- Hills were used as a dump for contaminated soil.
- In Germany conservation law demands that every deterioration of the state of the nature must be compensated. There is a cost reduction if the compensation can be carried out by the landscape measures.

Reduction of the nimby-effect

High quality landscape might improve the community perception of the commercial development and so reduce the "nimby" (not in my backyard)-factor

Indirect and external effects

Beyond these direct effects which accrue to the developer a high landscape quality development of commercial areas can be associated with several indirect or external effects. Among others the following effects have to be assessed:

- Increase of land values of surrounding residential property
- Creation of new jobs
- Improvement of the local or regional image
- Strengthening of the local and regional development
- Ecological effects

This presentation concentrates on the discussion of land values, the creation of new jobs and the strengthening of the performance.

Land values of surrounding residential property

Several studies show that there is a connection between a green surrounding

and land values of residential property: Studies in the USA, Canada, the UK and Germany indicate that proximity of green spaces increases house prices depending on proximity, type of park and visibility. However it is difficult to isolate the effect of the landscape quality from other factors that influence the value of residential property (Holm-Müller 1991).

Regarding the development of land values in the neighbourhood of brownfield redevelopment projects different stages of the site should be distinguished. It can be assumed that the closure of the old industry causes stagnation or even a decrease in the values of surrounding properties because it leads to a local depression with high unemployment rates, has an unattractive appearance and there is uncertainty about the future use of the site. After the brownfield redevelopment land values of the surrounding properties should increase however. Our hypothesis is that the increase is sharper in the case of the development of a business park (with a high landscape quality) than in the case of the development of a traditional industrial site (without landscape measures) because the green spaces have a nicer appearance and can be used by the residents, for example for walking the dog.

The increase in the value of properties resulting from the business park is not a public benefit but accrues to private property owners. It can be seen as an overall indicator of the benefits that accrue to all local residents as a result of the green space however. Following this consideration the analysis of property values often is used in the US und the UK as an approximation of the total external economic benefit. But external effects might be underestimated by this method because benefits which accrue to people who live outside the local area but use the green spaces as well or benefit of an improved regional image are excluded. Furthermore it has to be taken into account that green spaces are valued differently by different groups: While children like the wild forests on former industrial areas as an area for unrestricted experience adult immigrants prefer neat green parks.

Jobs

The number of „created or secured jobs" often is used as one of the main indicators of benefits of a commercial area. But in a market economy jobs are created because there is demand for certain products and not because there is a newly developed commercial area. Since in NRW there is no general shortage of commercial areas, the sites are not the limiting factor for job growth. Another argument against the causal linkage between site development and jobs is that most of the demand for commercial plots is regional. So there is mainly a redistribution of jobs within the region which can be classified as displacement effect. At least: Within the CSI-context only the jobs which are created due to the high landscape quality are to be counted. There will be few jobs which are additional in this sense. Therefore jobs are excluded from further analysis.

Regional development

High landscape quality of business parks can improve the local and regional economic performance by three ways:

- The improvement of the environment is an important soft location factor and can help to attract enterprises from outside the region or facilitate to find employees.
- The redevelopment can convince the local community of the future prospects of the quarter and encourage economic activities.
- Suburbanisation is often caused by a lack of green spaces. The development of business parks with high landscape quality is a great chance to improve quality of life within core cities. This can be an important contribution to counteract suburbanisation.

But the connection between the landscape quality of business sites and the regional development is quite indirect and will be rather weak for a single site normally. Furthermore the changes need a long period of time. Therefore a causal connection is hard to prove. It is not possible to quantify or monetize this effect either.

Empirical Analysis of Benefits of Landscape Measures in the Context of Brownfield Redevelopment Projects in the Ruhr Area

Intervention sites and reference sites

The analysis covers commercial sites which were developed in the Ruhr area on brownfield land during the eighties and nineties of the last centuries. Some of the sites were developed into business parks (intervention sites with high landscape quality) while other sites were developed into industrial sites (without high landscape quality); the latter are used as reference cases. All in all 19 sites were classified by site visits on the basis of the landscape quality matrix and reference pictures which were developed within the CSI-project.

Five sites were ruled out because they could not be classified unambiguously. So seven business parks and seven industrial sites in the Ruhr area were analysed. All sites are situated in the core area of the region.

Benefits of landscape measures

Because of time restrictions only a few results can be presented.

Comparing land values of the commercial sites

Generally land values of commercial sites in the Ruhr area are low compared with other metropolitan areas because there is an excess supply whereas the demand is weak due to the poor economic performance of the region.

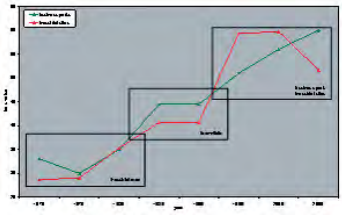

Figure 3 Development of average standard land values of investigated business parks and industrial sites 1970 - 2005

Note: The plotted boxes for the periods of old industry, brownfield and redeveloped site are to be seen more as a general indication because the exact date of transition of the sites differed.

Fig. 3 shows the development of standard land values of the sites. The expectation that the land values of the business parks generally exceed those of the industrial sites cannot be confirmed.

This corresponds with the result of previous studies in the Ruhr area. They show that firm owners predominantly think that a nice landscape on a commercial site is not really necessary. Only 20% attribute importance to it (Bauer 2005). Interviews with firm owners and experts which were made within the CSI-project came to the same result: The owners of the enterprises often like the high landscape quality of the business park in which their company is located but they are not willing to pay for it.

The attitude of the firm owners is backed by the discrepancy between supply and demand for commercial sites in the Ruhr area and the competition of sites which were developed on agricultural land. This makes it easy to find a convenient site at a low price anyway. In regions with another mix of branches and a higher demand for sites with high landscape quality an analysis might come to a different result (see for example Cox 2006).

On the other hand the acceleration of the selling process by high quality landscape is confirmed by literature (Ibert 2000) and developers (Köster 2006). This is an important advantage for the landowner whereas the regional effect might be

small due to displacement effects.

Land values of surrounding residential property

The time series analysis of standard land values of residential properties in the neighbourhood of business parks and industrial sites shows some stagnation between 1985 and 1990 while the index of the land values of residential properties in the Ruhr cities increased. By contrast there was a steep rise of land values in the neighbourhood of redeveloped brownfields from 1990 to 2000 (see fig. 4). This confirms the hypothesis that brownfield redevelopment projects have a strong impact on the local development. The stagnation between 2000 and 2005 corresponds with the weak economic development in Germany in this period of time.

Furthermore the comparison of land values in the neighbourhood of the business parks (with landscape measures) and the industrial sites (without landscape measures) shows that on average the increase is steeper in the neighbourhood of the business parks - especially after 1985 when the redevelopment projects started (see fig. 5). This indicates that the attractive landscape of the business park also yields a more attractive environment and a higher appreciation for the quarter which can be the basis for a positive future urban development.

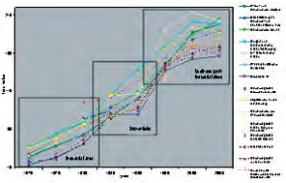

Figure 4 Land values of residential property in the neighbourhood of redeveloped brownfields in the Ruhr area 1970 – 2005

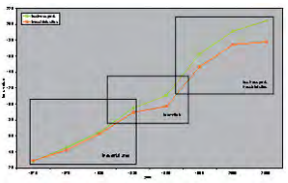

Figure 5 Average land values of residential property in the neighbourhood of investigated business parks and industrial sites 1970 - 2005

Resume

There are mainly three results of the analysis:

- The hypothesis that substantial landscape measures within brownfield redevelopment projects result in higher land values could not be confirmed. The reason might be the excess supply of commercial areas in the Ruhr region and the structure of demand (mainly light industry). Therefore in this region business parks with high landscape quality on brownfield land often are not profitable for a private investor.

- On the other hand the hypothesis that landscape measures cause an increase of land values is supported for the surrounding residential property. Indeed high landscape quality on commercial areas generates substantial external effects. It counteracts the lack of green spaces in the densely settled Ruhr area and upgrades the quality of life in the neighbourhood of the site. Thereby the development can encourage the community to tackle the local potentials and to face up future demands. Furthermore it can improve the setting for investment as a soft location factor. Therefore business parks with high quality landscape on brownfield land can be profitable from a regional point of view. Because of the long time period between cause and effects and several interfering factors the causal connection between the landscape quality of

business parks and the local development cannot be proven. But the impact of landscape measures on residential property values - the first link in the chain of evidence - seems to be a hard fact.

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6

Integrated Approaches for Land Management

6.1 Regional Settlement Management as Chance for Sustainable Development

Dirk Vallée

Abstract

In view of the massive changes to the population and settlement structures, an integrated strategy is needed for settlement, green space and transportation development. Considering the multifarious networks, in which the individual activities of people exist, and the distribution of these in an area, strategies must be initiated within the regional scale and the focus must be placed on the reduction of use of new areas and the intensification of use in the existing local infrastructure. In this context, a regional settlement management with the elements location communication system and a regional settlement management is an important contribution to a long-term, sustainable financial and socially productive structure. Within the framework of regional settlement management, transportation and open space must also be viewed in an integrated manner.

Introduction

A use of area for settlement and transportation is automatically the use of land as a resource. This resource cannot be increased and can hardly be regenerated. In view of the demographic transformation, it is important to develop a long-term productive concept for sustainable development of the entire region within the context of global competition and this concept is to give due consideration to and secure the ecological foundation, open the way for economic development and lead to a socially compatible atmosphere. In this respect, regional settlement management and the landscape park play a special role as a program for the enhancement and increased awareness of open spaces.

The Stuttgart Region

The Stuttgart region is located in the heart of Baden-Württemberg. Almost 2.7 million people, about one-quarter of the population, live in this region on 10 percent of the area of the state and produce around 30 percent of the gross national product. With a population density of 730 inhabitants per square kilometer, the Stuttgart region is one of the highest density conurbations in the Federal Republic of Germany and one of the 11 European metropolitan regions in Germany. The region includes Baden-Württembergs state capital Stuttgart and the counties of Ludwigsburg, Böblingen, Esslingen, Göppingen and Rems-Murr. The region has 179 cities and municipalities with populations between 500 and 570,000 and of these 65 with less than 5000 inhabitants and 20 with over 20,000 people.

In 1994, the Stuttgart Region Association

was established (www.region-stuttgart.org) along with its directly elected regional assembly and this gave the region its own political organization, which had a model character for other regions in the state and the federal level as well. In contrast to the other regions in Baden-Württemberg, which have the mission of regional planning and strategic landscape planning, this association is a multipurpose association and compared to other defined regions such as Hanover, which is a regional district, it only has a limited mission spectrum without any jurisdictional functions and is financed based on the pay-as-you go principle. The catalogue of tasks, which was transferred to the association by the state of Baden-Württemberg, encompasses important tasks for the future:

- Economy: Regional promotion of economic development and tourism marketing
- Transportation: Regional transportation planning and the agency responsible for important parts of the regional public passenger service
- Settlement and infrastructure: Regional and infrastructure planning and regional transportation planning
- Environment: Strategic landscape planning, concept development and agency responsible for installing the regional landscape park
- Culture and sports: Responsible agency and coordination of regionally important conventions and culture and sporting events (voluntary)
- Trade fairs: Responsible agency and coordination of regionally important trade fairs (voluntary)

Challenges for the Stuttgart Region

The common denominator for the developments in the European population centers is the intensification of all life processes. These include rationalization, growth and the increasing consumption of natural resources. Continuing long-term growth of the population in the region was accompanied by a super proportional sealing of the surface. For example in the 40 years from 1965 to 2005, the population in the Stuttgart region increased by 25 percent from 2.13 million to 2.66 million, but during the same time period the development areas almost doubled from 41,300 hectares to 83,400 hectares (see figure 1).

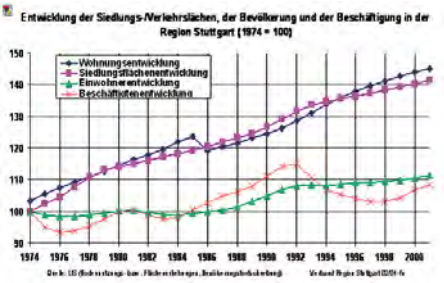

Figure 1: Development of Settlement Area and Population

At the same time, also an increase of the traffic volume and the distances traveled was observed. The number of vehicles registered in the Stuttgart region has more than doubled in the past 25 years from 826,000 to 1.71 million in 2000. This is also associated with intensive commuter linkage. For example, the situation often occurs where even in mid-sized population areas only about one-third of the jobs are held by the local population and two-thirds are performed by people commuting to these jobs and just as many commute to jobs outside of this area.

Currently, the Stuttgart region has an integrated development concept, which is contained in the 1998 regional plan, for the region (Stuttgart Region Association 1999) and this concept is based on a preview up to the year 2010. This applies in particular to the population trend and the resulting demand for area for residential and industrial use. According to this, it is expected that the population will rise from

its present figure of almost 2.66 million inhabitants to a good 2.7 million people. The age structure in the region is still very young in comparison to other major city regions in Germany and up to 2005 the statistics regularly showed a surplus of births.

Since the planning horizon, which is the basis of the present regional plan, has almost been reached, the region had the PESTEL Institute (Stuttgart Region Association 2006) prepare a further study with a model calculation of the population trend, the development of the labor market potential, the private households and the future demand situation for the regional housing markets. The model calculation was based on a birth rate, which is unchanged compared to the present rate, a life expectancy increasing by 1.5 years by 2025, a rise in the employment rate for women in almost all age groups and employment rate for men over 55, an interdependence of net immigration increases and the trend for the economically active population in the region as well as a balanced job trend at the present level.

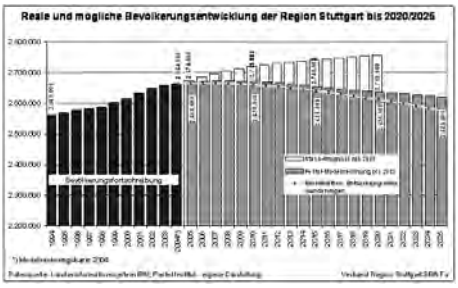

Figure 2: Population Development in the Stuttgart Region

It has been found that the mid-term demographic trend will lead to stagnation of the population number in the Stuttgart region in the mid-term (see figure 2). Even today the effect of this is that intensive municipal competition is heating up to attract inhabitants and taxpayers in view of the discussion about the demographic trend and the possible shrinking of the population. The cities and the communities are increasingly designating developed land in order to draw young families to them in the hope that the population number required for trading establishments, recreational facilities, schools and preschool facilities can be stabilized. This runs counter to the regional area management and the conservative handling of areas.

However, the extensive designation of areas, which may exceed the demand in the long-term, results in increasing burdens for the municipal budgets for the construction and the maintenance of infrastructure facilities. The predicted decline in the population will intensify these problems because the burdens are then distributed on fewer shoulders and any expansion of the infrastructure and networks leads to lower utilization densities in the face of a falling number of users. Plus, an increasingly aging population requires more transfers in the social area for the care of the older citizens. In addition, increasing environmental impacts are occurring and this is indicated by rising ozone values and a climbing CO2 percentage in the atmosphere. In the 12 years from 1985 to 1996 alone, the CO2 emission due to the individual motorized traffic in Baden-Württemberg rose by 37 percent. Further, these effects are intensified by the increasing sealing of surfaces.

Coping with these challenges requires regional management for all policy and specialty areas, which affect the location quality. In this respect, an integrated approach to the planning and development of residential, industrial, transportation and open areas must be taken.

Regional Settlement Management

Development structures, which save space, can be primarily created through use for other purposes and the use of existing areas. The number of deaths exceeding births, which are expected in the future, and the resulting increasing number of vacant apartments, the clearly declining numbers of younger people, who are establishing a household, and the associated decline in demand for apartments are

creating new opportunities to satisfy the demand for apartments from the existing housing. Any demand, which exceeds this due to the increasing singularization and declining size of households, and for commercial building space must initially be justified and presented in an understandable manner and if required be satisfied in a way, which saves space, and by drawing upon the existing infrastructure. Therefore in principle, before developing any external areas, efforts must be made to activate the internal reserves in the development structure. In order to advance this at the regional level, various strategies are to be applied, which are described in the following.

Location Communications System

Former rail grounds and commercial and industrial areas, which are unused, are primary examples of internal reserves. In order to make these transparent and make them reusable quickly, the Stuttgart Region Association together with its subsidiary, the Promotion of Economic Development Stuttgart Region LLC (Wirtschaftsförderung Region Stuttgart GmbH (WRS)) developed a regional location communications system in 1997 (http://sks.region-stuttgart.de/SKS/). In particular, this is intended to market available commercial properties and provide interested parties with all relevant information about size, location and building laws including a contact partner for initial contact. Of 179 municipalities, 132 are directly connected to the network through the location communications system or are provided brokering services by district companies supporting trade and industry through the location communications system. More than 90 percent of the available commercial areas in the region are included in the location communications system. Presently, 239 industrial areas and 262 industrial real estate properties are being offered. At the beginning of January 2001, the WRS was supporting 165 companies with the search for new locations.

In addition, on behalf of the WRS, the Chamber of Industry and Commerce and the Stuttgart Region Association, the Baden-Württemberg Municipal Development (Kommunalentwicklung Baden-Württemberg (KE)) 1997 (Stuttgart Region Association 1997) developed a practical guide for the reuse of former industrial areas, which are not being used, and this guide provides essential and important procedural steps for actions to revitalize and market such areas. Further, this also contains supporting materials, which potential investors and owners can use to estimate the expenditures for the required structural and other reconstruction measures. As a consequence of the results from the guide and the experience, which was gathered as of that time, the regional assembly decided in 1997 that costs for feasibility studies for the reactivation of regionally important areas, which were already developed and had an area larger than two hectares, would normally be supported by up to one-third, but a maximum of 25,000 euros, if the cofinancing was provided by the municipalities and investors or owners. Such subsidies have been granted in seven cases as of this time.

Pilot Project for Regional Policy Planning for Regional Settlement Management

Practice has shown that considerable difficulties have to be overcome before one can speak of the implementation of the strategy for „internal development before external development" and the reactivation of former industrial areas, which are not being used, satisfies the demand for space. Therefore, more advanced approaches are needed, for which a regional overview is required initially, as to what areas are available as a whole. This was created by the pilot project, MORO-RESIM, at the regional level for the first time. In order to promote the concentration of development areas and intensified internal development including in a growth region, the Stuttgart region was selected by the Federal Office for Building and Regional Planning (Bundesamt für

Bauwesen und Raumordnung (BBR)) as a model region and in cooperation with the Institute for Urbanism (Institut für Städtebau) of the University of Karlsruhe conducted a pilot project for regional planning for „sustainable regional settlement management“ (www.region-stuttgart.org/Aufgaben/regionalplanung/ MORO) (Stuttgart Region Association 2005). The goal was to determine and demonstrate the potential at the regional level, provide convincing information to the municipalities and to discuss and execute regional planning and fiscal instruments for the implementation of intensified internal development in the sense of regional area management.

The essential challenge for regional planning consisted in creating an overview of the possibilities for the internal development, which is often lacking at the municipal level, in a space, which has the complexity of a region. In this respect, the main focus of the work here was in the first stage of the project, which was to take a total of three years. During three survey phases, about 1600 hectares of internal development potential and approximately 4000 additional hectares, which represent external development potential, were recorded in 75 of 179 municipalities in the region primarily in the development axes and the individual areas concerned here are bigger than 5000 square meters (see figure 3). Thus, about half of the entire area of the region with about three-quarters of the population was recorded. If this is extrapolated for the entire region, then around 2000 hectares of internal area and an additional 5000 hectares are available. Based on this recorded information, a building area balance for the region was prepared, which can also be used for additional planning questions and in particular for the future monitoring process required as part of the strategic environmental assessment or observation of the area.

Such an overview and the coordination, which was conducted for this, are a prerequisite for the initiation of municipal co-

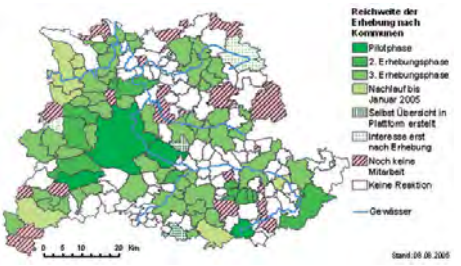

Figure 3:
Participation during the Survey Phases

operation for the assessment of alternatives to development area designations, which have been considered and which were the focus for the second stage. When this was done, in-depth considerations were made in coordination with six municipalities up to the test planning level in subareas, which are representative for the region, and discussions with developers explored the opportunities and where the significant hindrances are located. The open dialogue and the desire for mutual cooperation have promoted understanding for the goals of regional area management and also for the concerns of regional planning for the 70 municipalities, which are involved, and reinforced the perception of the equal treatment of all those participating. Thus, the project work also contributed to the internal integration in the region.

Overall, it was shown that the active pursuit of a differentiated strategy for internal development is an important regional building block for settlement management. In particular for the Stuttgart region with its very heterogeneous dimensional structure of the municipalities, a competence office for internal development at the regional level can provide valuable assistance and support and especially for the smaller municipalities, for which in cooperation with the Swiss Technical University of Zurich, neighboring regional associations and the state of Baden-Württemberg, the follow on project RAUM+ is presently conducting in-depth studies with respect to a meaningful specification of tasks and personnel and financial re-

sources.

An additional approach, which is presently being regularly practiced by the Stuttgart Region Association, is to require overall area balances for comments from the region on updates and changes to the zoning plans for cities and communities and to credit area reserves to the new requirements. For the adjustment and the coordination of goals for the regional plan, the following potential is being surveyed in particular: areas, which are not covered by a legal plan, reserve areas in legally binding building plans, Section 34 of the Building Code areas, and areas, for which long-term planned use for another purpose exists, such as from urban and municipal development concepts. In addition, the actual implementation of urban development plans at the regional level is examined regularly. The areas are identified, which are covered by zoning plans.

Fiscal Effect of Municipal Strategies for Developed Land

To provide additional knowledge about the internal development potential, a study was conducted (Stuttgart Region Association 2007) to determine the fiscally best developed land strategy for municipalities. The basis of the studies is that the demographic transformation, in particular the aging of the society, will also occur in the Stuttgart region and especially the development of income for the municipalities due to the declining demand for developed land and the lower taxability of retirees compared to people, who are employed, and stagnating to declining population numbers as well as the resulting reduced allocation of revenue according to the Financial Equalization Law are losing their dynamics.

The study has arrived at the following central conclusions:

1. Based on this background, the more developed and transportation area that is built on additionally, the greater the reduction of the settlement density. Further, additional developed areas cause additional costs for maintenance and reinvestment. The gap between municipal costs and income is growing inevitably due to new building areas than without new building areas.

2. The municipal income is more influenced by external sources such as taxability and the long-term infrastructure consequential costs are solely dependent on the municipality's own decisions.

3. Income from real estate revenue is one-time income and is marginal seen from a long-term perspective in relation to the continuing maintenance costs required for buildings or support and educational facilities.

4. The social infrastructure and in particular the preschool services cause high consequential costs. At the same time here, including due to the structure of the state subsidies, the biggest potential for cost savings exists. As a result of the demographic trend, in the mid- term it is impossible for municipalities to utilize the full capacity of the social infrastructure through new building areas because the required increase due to immigration is not to be expected. In this respect, a developed land strategy, which is based on immigration, is very risky.

5. It has been shown that the strategy of internal development is also very advantageous from a fiscal aspect as well.

With these materials, regional planning can provide consultation and support for the municipalities concerning questions of long-term financial consequences and the results for the infrastructure. For this purpose, the exchange of experience between the municipalities is an initial useful measure so that the municipalities can exchange information about the solu-

tions, which have been considered and in some cases tested. In addition in the mid-term, the challenge exists of initiating inter-municipal cooperation including for facilities for the support and education infrastructure as well as for the social infrastructure.

The Regional Plan as an Overall Strategy

Based on this background of the knowledge, which was described, there is an essential task for regional planning as a long-term active and integrating planning discipline to control and reduce inner regional immigration so that the competition for lots is not conducted to the detriment of open areas. For this purpose and on the one hand, regional planning can support development strategies, which save area, through communication with and consultation and support of the municipalities and, on the other hand, through the quantitative control as part of the regional plan it can carry out the quantitative limitation of developed areas and location control. Therefore, the systematic orientation of the settlement development on productive axes of regional public passenger service, which are represented by the settlement axes shown in black, and a concentration of focal points for residential and industrial as shown in figure 4 is necessary.

For further settlement development, the Stuttgart region is focusing on the concentration of the settlement development on the development axes, which have rail-connected regional transportation, and the designation of settlement focal points. The creation of industrial areas, which serve several municipalities, is a special aspect for the formation of focal points. In the future, it will also be an essential task of the association to promote and advance these inter-municipal industrial areas with support of the development costs and subsidization of interest during the development phase. Municipal and county borders are political boundaries and not business borders.

The Landscape Park as a Green Infrastructure

In addition to concrete examples for measures for area management, there are also fundamental measures for the reduction of the use of area and the suburbanization. The classic answer from regional planning to this is, in addition to the above examples, the protection of open areas through regional stretches of green, green divides and priority areas for agriculture. This helps the attractiveness of the location as a whole and thus the population, economy and the environment. Without regional green divides and green stretches, there would be, for example, an interrupted settlement band today connecting Geislingen in the southeast of the region and Göppingen, Esslingen, Stuttgart, Ludwigsburg and on to Bietigheim-Bissingen, which is a distance of more than 90 kilometers, in the northwest of the region.

The fact that a region needs efficient infrastructure facilities and development areas for residential and industrial purposes is generally accepted. However, this alone cannot create any quality of life. The creation of local recreational opportunities and the protection of open spaces is needed. In the updating, which has been completed, of the regional plan, the Stuttgart Region Association designated additional areas, which amount to around 3500 hectares, for new housing and industrial areas, but this must also be seen in comparison to 9800 hectares of green stretches and green divides. In addition, the landscape park for the Stuttgart region (Stuttgart Region Association 1994) is being pursued as a new approach as an answer to the increasing compression and settlement in the region. This means planning and investment in the structuring of open areas. The landscape is one of the essential soft location factors and in view of the existing qualities associated with the Neckar, the Swabian Jura, Swabian Forest and the Korngäu and Heckengäu, the Filder Plane and multifarious other subareas this is a special character-

istic of soft location factors. However, the landscape park is not to be understood as an artificial garden area such as that of Prince Pückler in Wörlitz or the palace garden in Stuttgart. On the contrary, the particular nature and the qualities of the specific subareas of the region are to be emphasized through the inclusion of the natural and cultural monuments. In this respect, this is concerned with continuing to allow the existing uses such as for agriculture and connecting them with other needs such as local recreation.

The implementation of the landscape park is proving to be problematic due to the fact that, on the one hand, the areas, which are to be enhanced, are often not held in public ownership such as by a municipality, county or the state, and, on the other hand, the measures, which are to be taken, are often not in the center of the municipal interest. The rehabilitation of town centers and urban construction measures are more likely to be of interest than the enhancement of the local recreation area on the local subdistrict boundary with the neighbors.

The intent of the landscape park is to achieve added value for the local recreational opportunities for the population within the existing structures by means of the proximity of agriculture and forestry, local recreation opportunities and landscape protection. In individual cases, it will be necessary to acquire property for this purpose and use such property for other uses and in this respect the financing can often be provided by possible compensation measures for infrastructure projects. In this respect, the basic principle is to employ the potential, which develops due to the improvement of the economic infrastructure, for the enhancement of the open space together with agriculture and forestry for the well-being of the population and improvement of their local recreation opportunities.

Summary

In view of the massive changes to the population and settlement structures, an integrated strategy is needed for settlement, green space and transportation development. Considering the multifarious networks, in which the individual activities of people exist, and the distribution of these in an area, strategies must be initiated within the regional scale and the focus must be placed on the reduction of use of new areas and the intensification of use in the existing local infrastructure. It is only in this way, that long-term, sustainable financial and socially productive structures can be secured.

Within the framework of regional development area management, the areas of settlement areas, transportation and open space must be viewed in an integrated manner. A special contribution is provided by the following:

- close interlinking of settlement and green space development with transportation planning in order to avoid negative consequences. These disciplines must go hand in hand;
- further development of regional policy planning and regional planning and their instruments in the direction of a regional land development plan, which allows the planning of areas for certain uses for the municipalities, but sets limits for the suburbanization and the resulting transportation problems;
- the systematic implementation of landscape planning, which includes several locations, to assure the continued existence of the existing and varied nature area. Here, it is important to emphasize the qualities of the local recreation area in order to underscore the soft location factors as well. Therefore, it is necessary to the make the existing qualities in the region experiencable and to secure their continued existence

and develop them further;

- the development and implementation of strategies for sustainable regional area management as well as transparency, support and equal treatment of the municipalities and the systematic implementation by means of regional planning.

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6.2 Approach to brownfield revitalization for small cities in the Czech Republic

Ivan Vaníček, Daniel Jirásko

ABSTRACT

Decision making process on municipal level for smaller cities (roughly 4 -15 000 inhabitants) especially where there is no strong investor, is very problematic. The paper will deal with three subjects, which can help to the clerks on the municipal level to define strategies how to solve problems connected with brownfields in their regional towns. The first part will deal with Database of practical examples, which were solved during last years and where are useful information and all contacts. The database can help to spread the good and bad experiences and the exchange of knowledge. The second part is focusing on the first phases of the remediation process with the help of very good information that can be obtained about existing brownfield and its potential impact on the environment. First of all it is a desk study, where the utilization of a set of geo-environmental maps is playing the most significant role. Last part of the paper will show one practical example.

Introduction

For smaller cities, especially on the municipality decision level, it is very important to start with the first step in brownfield redevelopment, eg. Vaníček and Jirásko (2006). In our paper we decided for the following three possibilities which can be rather cheap and can be applied without special problem.

The first possibility is to compare concrete case in a certain city with existing database of brownfields, which were recently remediated. Rather useful information can be obtained from the database and especially it can be used as first imagination about the price and about the problems we will have to face / deal.

The second possibility is the realization of the first steps of the remediation process, which are usually connected with site identification and first phase of geo-environmental investigation. Desk study - archive and up-to-date data collection supplemented by site walkover can be performed very quickly and with minimum financial input.

And finally the third opportunity offers detailed description of the real case, where problems connected with remediation are described very carefully.

Therefore all these three steps will be described in more details. Especially the first two possibilities are each easily reached by municipal clerks because the database is on website and information about geo-environmental investigation was printed in a special journal „Modern town is designed for municipalities", Havlice and Vacek (2006).

Database of practical examples

In the Czech Republic there are different databases of brownfields. The main brownfields connected with large industrial sites are part of the database prepared by the CzechInvest for more sensitive cases with the support from EU. This database is used mostly for strategy of brownfields remediation in the Czech Republic.

On the other side the smaller ones are much more under the interest of the Ministry of Local Development. With financial support of this ministry the database of existing cases of revitalized brownfields, preferably for smaller towns, was prepared at the Czech Technical University. Up to now this database contains roughly 60 examples of brownfields, which were already revitalized in different parts of the Czech Republic. The municipality representatives were invited on different seminars where they received the first information about this project and they were introduced with web pages where these first sixty examples were presented.

The results of database are open to the public on the web http://dotaznik.brownfieldsinfo.cz and anybody can display the collected data about concrete sites. For adding new brownfields the registration is required.

The database includes the basic information about brownfield such as location, area, price, information about previous use, about contamination and realized treatment. Further it is possible to obtain the data about new project and new use of property, about time schedule, financial aspects, etc. It is also possible to show map and photos before and after redevelopment and so learn as much as possible from the concrete case.

The municipality representatives were informed about access to the database and they were asked to put their own experience into the database.

Main phases of the brownfield redevelopment

Very often the whole remediation process can be divided into the following steps eg. Vaníček (2006), Vaníček and Valenta (2006):

- Site identification,
- 1st phase of investigation,
- Preliminary economic analysis,
- 2nd phase of investigation – detailed site analysis,
- Planning including site development and methods of finance – feasibility study
- Identification and selection of appropriate site remediation
- Identification and selection of construction techniques

From this it is obvious that the first preliminary economic analysis can be performed after the two first mentioned steps. After the first phase (first two steps), the local authority can realistically evaluate and advise on future requirements, having sufficient information on the nature and extent of contamination.

First phase

Site identification is connected with investigation of the site using real-estate registers, where preliminary information regarding the site area, ownership, and other pertinent data can be obtained. Typical problem with ownership exists as the land ownership has often changed over the last 65 years – as is the case at the beginning and at the end of the Second World War or as a political environment changed after the years 1948 and 1989. In this case other historical documents can be used.

The 1st phase of investigation tends to allow the preliminary assessment of the

potential chemical, biological or physical nature of the subsoil.

Site walkover - visual inspection

The main aim of the site walkover is to evaluate the site, particularly geomorphology of the wider area, surface water, groundwater (from old monitoring wells), discussion with owners, information about vegetation, inspection of existing buildings with assessment of their condition, with particular reference to any unusual symptoms, including colour, odour, anecdotal information, discussion with former employees. All visual inspections should be accompanied with photographs, videos, etc.

Archive and contemporary data collection

At this stage useful information is collated for structures, but also about former industrial processes, and associated materials and the sort of waste material produced. From archival and other historical documents information can be obtained on potential problems or past incidents and from these data a judgement can be made on the probability of soil and water contamination and hydro-geological consideration should be taken into account. The main steps are as follow:

- General information about buildings
- History of building utilization
- Information from archive and other historical documents
- Materials from hydro – meteorological institutes
- Material from aerial observation – military and civic photographs.

On this level the set of geo-environmental maps can play very important role.

This set is in the scale 1:50 000 and covers all the Czech Republic territory. A collection of geo-environmental maps consists of up to 17 different maps starting from geological map (see fig 1), hydro-geological map (see fig 2), engineering geology map, mineral deposits map, and ending with map of surface water geochemistry (see fig 3) or map of geofactors of environment. For larger cities maps in the scale 1:5000 can be obtained and the set of these maps consists of geological map, hydrogeological map, map of superficial deposits, map of documentation points (points of previous investigations – boreholes, the results of borehole description and samples testing are deposited in Geofond).

Figure 1:
Example of the Geological map (1:50 000)

Figure 2: Example of the Hydro-geological map (1:50 000)

Figure 3: Figure 3 Example of the Map of surface water geochemistry (1:50 000)

Data evaluation from the preliminary phase

The main aim of this phase is to collate all available pertinent information with

minimum financial expenditure, giving reliable answers on the following three aspects:

- Potential site contamination – the preliminary phase of investigation involves collating all relevant available information, from which it can be determined whether contamination may be present, at what level and to what extent. Also based on appropriated data an estimate can be made of the possibility of contamination movement within the subsoil (e.g. direction, velocity) and what impact on the surrounding environment it will have.

- Evaluation of the potential of the site – information which makes the best account of this includes the size of the site, disposition, quality of buildings, halls, technical equipments, quality and density of engineering networks, what can be used in the future, what is recommended for demolition etc.

- Site attractiveness – in which part of the city it is situated, what is the traffic accessibility, what competition is in nearby. What restrictions exist (from the owners point of view), whether there are existing liabilities. Comparison with similar localities or similar projects, why they were successful or only partly successful and details. What is the impact of the remediation process with respect to humans and what benefits society and the local authority can get (higher prices of the surrounding areas, lower unemployment etc).

All the collected data are very important for first economic study which can divide the sites on: sites with high attractiveness, interesting sites, less interesting sites and very problematic sites.

According to our opinion all obtained information are very useful tool for decision making on the municipality level and should be recommended to all municipalities dealing with the problem of brownfields.

Practical example – Desk study of alternative redevelopment of slag dump Bílá Halda in Rokycany

The slag dump Bílá Halda is situated 800 m from the centre of town Rokycany and its area is approximately 1ha. The view on the dump is shown on the figure 4. This dump consists of waste slag, which resulted from the metallurgical industry of nearby situated foundry. From 1898 there was deposited approximately 45 000 m3 of slag which is now very hard and has more or less character of a rock. See figure 5.

Figure 4: The general view on the slag dump Bílá hald

Figure 5:The hard character of slag

The municipal authority presented interest in redevelopment of this brownfield with minimum financial expenses and

therefore Czech Technical University was asked for cooperation with production of preliminary study for next decision making process of local authority. The desk study was made there at the level of Site identification phase and 1st phase of investigation with use of all available documents. Because contamination wasn't found on the site, several alternatives of future utilization of the locality Bílá Halda were proposed with respects to the following aspects:

- The area of Slag dump will be prepared for new buildings – different versions connected with different amount of slag withdrawal
- The price of revitalization of 1 m2 doesn't exceed the usual price for 1m2 of the house lot in the region
- Preferential reuse of excavated and crushed slag as a fill to the earth structures or as aggregates to the concrete.

Conclusions

In the Czech Republic relatively simple system of brownfield remediation especially for small cities was established. This system can be used for the decision making process on the municipality level without any problems. Therefore in the paper three different steps were described in more detail as are the utilization of brownfield database, application of the first step of geo-environmental investigation and finally the comparison of the individual case with the case which is described and specified with high preciseness. This system proves to be very useful.

Acknowledgement

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6.3 Online Database on Land Management – an Effective Tool to Support Practitioner in Land Management and Brownfield Recycling

Jantje Samtleben, Volker Schrenk

ABSTRACT

There are a large number of recommendations for action, project studies and reports on the subject of land management and land revitalisation available in Germany. Over the last few years, numerous projects were carried out in order to improve land management and land revitalisation made possible through the gained knowledge and recommendations for action. This ought to contribute to a reduction of the high land consumption. In the context of this research project currently available publications concerned with land management were researched and evaluated. These publications were summarized, essential recommendations for action were elaborated and the publications were classified with regard to their subjects areas and the targeted groups. The evaluations were transferred to an elaborate and Internet accessible data base which can be found at http://www.flaecheninfo.de. With the help of the search function, a targeted inquiry of the data bank for literature is possible under different search criteria.

Introduction

For several years the Federal Republic of Germany has intensified their activities, in order to reduce the high utilization of land. During the last years former agriculturally used areas were converted to developed land. This utilization of land decreased from 130 hectar / day at the end of the 1990's to approximately 115 hectar / day in 2001 - 2004 (BBR 2006). The reason for this decrease, however, is mainly due to the negative economic trend and not due to sustainable handling of the resource soil.

The last two decades were characterized by this high consumption of land. In reaction to this trend the Federal Republic of Germany intensified research efforts to reduce land consumption within the last years. The government goal is a reduction of land consumption to a level of 30 hectar / day till 2020. For that reason the cabinet and the regional governments assist many different research projects related to land management. Various articles discussing the results were published.

A project worth mentioning which was implemented in the federal states of Bavaria and Baden-Wuerttemberg is titled: „Land Resource Management". The project provides a comprehensive tool for a sustainable handling of land management. Thereby the tool is available as a device for treatment and implementation of land revitalisation and management. In addition, some federal states in Germany e.g. Baden-Wuerttemberg established different programs such as the project „Flächen gewinnen (Area Win)".

The German government also intensified its engagement in reducing land consumption through the program „REFINA".

An investigation in numerous municipalities of Baden-Wuerttemberg shows that nearly all publications and reports were not known to and therefore not used in the administrative practice (Schrenk & Schlicher 2004). The investigation also shows that there are initiatives and projects in different federal states which pursue partially similar contents and/or goals. This results in the waste of financial resources in academic research which could be avoided.

Approach

The project started with a detailed library-, data base- and internet research to compile existing publications of land management in Germany. Thereby the search at different Ministries and authorities' web pages proved helpful as well. The emphasis was on the Federal Ministry of Education and Research (BMBF), the Federal Environment Agency (UBA), the Federal Office for Building and Regional Planning (BBR) as well as on national offices/national institutes for environmental protection and on financed publications. The time frame of our research reaches back to the 1990s.

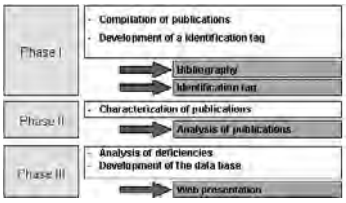

Figure 1: Procedure

The acquired materials of practice-oriented literature were compiled in a bibliography. During the literature research, the publications were categorized in topics that include, according to the publication "Local Land Management" (LFU 2003) the following areas:

- Filling of building gaps and mobilizing inner-city building places,
- Optimizing the utilizable value of land,
- Land revitalisation and the handling of contaminated land,
- Receipt and re-establishment of the functions of soils,
- Handling of the resource soil in civil works,
- Minimization of the soil covering degree,
- Protection of efficient soils as well as
- the protection and the development of open spaces

Apart from these topics additional themes and special issues were considered e.g. questions of financing, as well as case studies in land management, project management and communication.

Since there are already extensive systems of decontamination techniques available on the Internet, specialized publications related to clean-up operations were not considered. A clean-up operation data base worth mentioning is „Das Alfaweb" of the Federal Environment Protection Agency of Baden-Wuerttemberg, which can be accessed at: http://www.xfaweb.baden-wuerttemberg.de/alfaweb/.

In order to guarantee a uniform collection and characterization of the different publications, an identification tag was developed. The articles for characterization cover the basic information, such as author, feature year, publisher, a summary of contents, possible restrictions, as well as substantial recommendations and realizations regarding the completion of land management projects. For an easy search in the data base the publications, keywords were assigned, as well as a list of the target groups which would be interested in the publications.

Figure 2: Developed Identification Tag

The collected publications were summarized and evaluated. The articles were characterized due to the identification tags. The emphasis was on stressing the substantial statements and representing the recommendations for practical application.

Parallel to the evaluation of literature, the programming of the Internet data base which should contain the results of the investigations took place. The identification tags for the characterization of the publications were transferred into the data base and an appropriate input mask was programmed, which allows a direct input of bibliographical evaluations online. The application of data bases is appropriate for a goal-oriented and fast information search and is available on the Internet at: http://www.flaecheninfo.de.

The publications in the data base were finally assigned to the main topics:

- Planning,
- Execution,
- Management,
- Financing,
- Description of concrete projects,
- Legal Questions and
- Safety.

Thus, a collection of land management was provided, which is structured according to the listed topics. In case a publication is concerned with different themes, it appears in several topic areas.

Results

As a result of the project, a comprehensive bibliography of available and practice-oriented publications on land management/ land revitalisation is available.

The Literature Research

The research found that numerous publications were difficult to obtain. They are available only directly through the publisher or the author of the studies. In addition, it became clear that a large number of publications were published only online. In order to access these articles, the exact web address is required or appropriate search machines need to be known. The investigations also showed a wide spread of topics related to land management: Apart from the pure environmental topics, there are numerous publications concerned with the urban aspect and/or with economic and social topics. On a federal level publications in land management were released by the Federal Office for Building and Planning (BBR), the Federal Environment Agency and the German "Institut for Urbanistik" (difu). There are also different reports from the Federal Ministry of Education and Research (BMBF), the Federal Ministry of Transport, Building and Urban Affairs (BMVBW) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BUNR). Beside the Ministries, some federal governments promote research in land management, e.g. through a program in Baden-Wuerttemberg titled "Baden-Württembergisches Programm Lebensgrundlage Umwelt und ihre Sicherung (Foundation of Environmental Existence and their Protection) BWPLUS" as well as the environmental political emphasis on „Kommunales Flächenmanagement (Local Land Management)" announce their engagement. In relation to these actions numerous publications originated, which are present as research reports, EDP applications and action assistance.

Due to specific regional problems and frameworks, many federal states have a different emphasis in their research projects. As a result, North Rhine-Westphalia shows a large number of publications concerning the conversions of military properties. Furthermore some publications are concerned with the particularly problems in the former GDR e.g. the recycling of brownfields in suburban areas. The investigation showed in general that only through a very systematic search numerous publications are detectable. This opposes an application of the working helps database. Two different databases will be useful examples. The Bavarian collection of publications and interesting links, accessible at: http://www.boden.bayern.de (link: „Literature ") as well as the North Rhine-Westphalia web page on land use http://www.flaechennutzung.nrw.de. However, this data bases is more geared toward the interested citizen and contains less references or action assistance.

Analysis of the publications

In the course of the literature compilation, more than 140 different publications related to land management were researched. The available publications cover almost all issues related to land management. Such issues include among others: structure removal, uncovering of soil surface, funding, brownfield cadastral, and conversion of military sites, and the documentation of case studies. The projects often emerged on behalf of different ministries or regional authorities, respectively and can be downloaded on the Internet. It is striking that the number of publications providing really utilizable and practice oriented recommendations is limited. In general, publications can be classified as motivational brochure (which ought to arouse interest), reports (documentation of research projects) and working tools/ recommendations for action.

The Data Base

The online- data base of land management (http://www.flaecheninfo.de) was developed in coordination with specialists from different ranges of land management. The involved specialists decided for a clear and easy web presence. Thus the goal is to get structured and allow rapid access to the searched information.

Beside the introduction on the first page with a short overview about the project, there are six menu buttons:

- Search
- Subject Area
- Place Publication
- Links
- Contact
- Logs in (for the staff)

Figure 3: Welcome page of the data base

Search function: The search function is a simple search application of the conventional kind (input of terms). One or more terms can be entered and linked with and/or. The search includes all areas of the data base. As a result, a list of publications, containing the chosen word, is made available. An extended search function is available for the specific search of publications.

Subject Area: A high-speed search in different topics (e.g. building retreating, financing or environmental protection), is offered through the menu option „ Subject Area". In this option, all publications are categorized regarding their relevant themes and topics.

Place Publication: Authors and publishers have the possibility to integrate their work directly into the data base. In that way it can be ensured that the data base stays up-to-date and the number of contained publications will continue to rise.

Links: The menu option „links" shows the contacts of publishers and important institutions related to land management such as Ministries and Agencies.

Contact: Our contact: VEGAS, Institute for Hydraulic Engineering, University Stuttgart

Log in: use is restricted to staff

Deficiencies

The compilation and evaluation of the publications showed that there is literature available, covering various topics in relation to land management with a varying dedication to details. In general, there is an insufficiency in the availability of practice-oriented publications with usable and applicable advises and results. Positive and realisable examples are the recommendations for action in land management in Baden-Wuerttemberg and Bavaria, which were developed in close collaboration with local representatives. In many of the analysed publications it became clear that the transfer of knowledge from the research to the practice does not work. A majority of the publications is written without a clear result part, a conclusion or a summary of the substantial recommendations. In general, negative results should be emphasized more clearly and be more published, in order to prevent a repetition of such developments in another place/location. Therefore, an anonymization could be helpful.

Conclusions

The project showed that the federal as well as the regional government level in Germany is very engaged in issues related to land management. Many projects were supported and from those numerous publications on land management issues originated.

The online data base for land management provides a comprehensive literature tool, which can be used online and free of charge by the public. Only with the support of engaged professionals, it will be possible to maintain and extend the current conditions of the data base

Different search functions make it easy to search for literature under diverse criteria like references, authors or publishers in the data base. Besides that authors have the possibility to integrate their work directly into the data base. The online data base on land management is thereby a practice-oriented tool for research related to land management and land recycling.

Acknowledgment

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6.4 "Rebuilding Suburban Detroit Redevelopment Ready Communities" (RRC): A Model Program

Robin Boyle, Melanie Piana

Setting the Context

The growth of the American suburb throughout the twentieth century exemplified the power of private property development, encouraged and directed through various public incentives. This short paper illustrates a redirection of this tradition, focusing on an initiative in suburban Detroit: the Redevelopment Ready Communities (RRC) program. In summary, this is a variant of a public-private partnership, one that encourages building back into the older, "first ring suburbs", presented as one alternative to suburban sprawl. RRC is a three-way partnership between a nonprofit agency (the Michigan Suburbs Alliance), units of local government and the development industry.

Literature on the diversity of the America suburb has flourished over the past twenty years. From Kenneth Jackson's (1985), classic "The Crabgrass Frontier: The Suburbanization of the United States" through Kunstler's (1993) "The Geography of Nowhere", Andres Duany's "Suburban Nation" (2000), Delores Hayden's (2003) "Building Suburbia" to Robert Bruegman's "Sprawl" (2006) writers from a variety of disciplines and perspectives have sought to capture the essence of many different suburbs. A summary of this burgeoning literature by Lang, LeFurgy and Nelson (2006) divides the American suburb into six categories, each reflecting the era during which they developed. They particularly identify the early Town and Country Suburb: separate entities connected to the central city by horse-drawn streetcars and then twentieth century Streetcar Suburbs: extending out from the central along radial routes, connecting residential sprawl with retail expansion. Over time, this initial suburban development evolved into (often) small, individual units of government, each eventually competing against

newer, (often larger), outer suburban communities.

There is, however, no single, uniform, title or definition of inner ring suburb. Lee and Greene Leigh (2005) identify nine different terms applied to this distinctive geography ranging from "inner suburbs" (Jackson, 1985), "inner-ring suburbs" (Downs, 1997), "sitcom suburbs" (Hayden, 2003) through to "first tier suburbs" (Hudnut, 2003). These communities are characterized by their location relative to the central city, (often immediately adjacent), the period when property was built (in two phases: in the first decades of the twentieth century, then in the immediate post WWII era), and the predominant function/land use (mainly residential, but this clearly varies by era of development. The literature on suburbs, especially the inner ring suburbs, focuses on their relative decline in comparison with the outer suburbs, on their distinctive socio-economic structure, on the nature of the built form and on the condition of the property market. (Lucy and Phillips, 2002). Even though suburbs have similar characteristics, first suburbs are also often quite different from each other- especially between regions. The Southwest suburbs have different trends compared to "Rust Belt" Midwest suburbs, and even differences between Washington, D.C. (Puentes and Warren, 2006) According to the Brookings Institution, the lack of clear definition of "first" suburbs helps reinforce the notion that these places are caught in a policy blind spot.

The Michigan Suburbs Alliance states that the inner-ring or „first" suburbs are the suburbs adjacent to or located in close proximity to major cities like Detroit. Because of their close location near the urban core, these cities were among the first suburbs to develop and are usually among the oldest in a metropolitan region. Their economies and social networks are often characterized by a strong interdependence with their core city. These cities are not completely urban, nor do they fit the traditional description of „suburban". "Challenged by deteriorating infrastructure, built-out land, increasingly diverse populations, and growing concentrations of poverty (Berube and Kneebone, 2006), these suburbs face a unique set of challenges that puts them in a category of their own." (MSA website, December, 2006)

The RRC initiative, focusing on the redevelopment of inner ring suburbs, can best be viewed from two policy perspectives. First, encouraging the redevelopment of central cities and their older suburbs is presented as one dimension of "smart growth", part of a broader reawakening of interest in regional planning and growth management. Secondly, attracting reinvestment back into the urban core is as seen a fiscal necessity, with the redevelopment of buildings and vacant sites offering the potential of additional tax revenues for cities constrained by strict State regulations.

Before describing the RRC program, it is important to set suburban planning and development into political context. Simply, Michigan does not rank highly in terms of States in the Union that place a premium on effective land use planning. In a nation-wide ranking of States, the Sierra Club (2000) found Michigan tied dead last in terms of the quality of state land use planning and related measures for controlling growth. With 1860 units of government with planning and zoning authority (83 counties, 1242 townships, 273 cities and 262 villages), plus 555 separately-elected and run school districts and another 277 special authorities, Michigan's pattern of local government and administration is itself a serious barrier to coordinated growth management and planning.

On assuming office in November 2002, Governor Jennifer Granholm announced the formation of a bipartisan Land Use Leadership Council, "charged with studying and identifying trends, causes and consequences of urban sprawl and providing recommendations…to minimize the negative effects of current and projected land use patterns on Michigan's environment and economy" (MLULC, 2003:1).

The council provided 212 recommendations to the governor and the Michigan legislature designed to minimize the impact of current land use trends on Michigan's environment and economy. Since the release of the report, progress has been slow to implement; approximately 7.5% of the recommendations have been fully addressed compared to 72% not yet addressed. Another 7.5% have been partially addresses while 13% are in progress. (People and Land, 2007)

In the section of the report entitled "Urban Revitalization" one of the key recommendation stated that "the state should, in concert with local government, coordinate and review proposals to ensure that they effectively promote new private investment and reinvestment in existing urban areas that (1) optimize the use of existing infrastructure, (2) encourage new retail businesses to serve urban residents, (3) create new employment opportunities, and (4) otherwise enhance the quality of life in urban communities " (Recommendation 4.2) …"Defining, in consultation with the private sector and local communities, a set of redevelopment readiness standards by which local governments may measure and promote their ability to compete for private redevelopment investment and state technical and financial assistance" (MLULC, 2003: 33/34). In essence, this

"in progress" recommendation resulted in the Redevelopment Ready Communities program.

Michigan Suburbs Alliance

In June 2002, a group of mayors and city managers from 14 metro Detroit inner-ring suburbs unanimously agreed to form the Michigan Suburbs Alliance. Deep concerns were expressed over the lack of independent resources each city possessed to adequately address issues such crumbling infrastructure, declining populations, decreased state and federal funding, and, of course, their struggles to make ends meet with the state's municipal finance policy draining away their property tax revenue. These city leaders understood that finding solutions to their shared problems would require cooperation among similar communities across the region. Since the organization's genesis, it has grown to encompass more than half of the region's mature, inner-ring suburbs, representing nearly 1,000,000 residents (see Figure 1). The mission, vision, and programs are focused on grassroots organizing, fostering new relationships and partnerships and build consensus on contentious issues to actively change the paradigm surrounding state-wide and regional land use policy and practices.

Redevelopment Ready Communities (RRC) Program

The signature program of the Michigan Suburbs Alliance is the Redevelopment Ready Communities program. The goal of the program is to arm cities with streamlined, efficient development processes and well-planned strategies for attracting redevelopment. For this reason, it encourages communities to incorporate several key elements into their redevelopment processes:

1. Cities need to create open and predictable engagement steps for the investment industry. When processes are clear and consistent, developers will enter a community with greater certainty about the quality of service, specific requirements and overall environment for development. They can expect to engage in a process that is efficient, predictable and deliberate.

2. Have a clear, community-wide vision and public engagement process to address redevelopment opportunities. RRC encourages communities to engage in redevelopment planning, upfront, that incorporates public opinion and creates a coherent vision for revitalization. As a result, local leaders are empowered to take advantage of existing underu-

tilized local infrastructure capacity, promote sound economic development, and reduce regional urban sprawl.

3. Focus on building relationships and networking to market the community. A lack of trust can impede the efficiency of any redevelopment project. In the course of analyzing and revising their redevelopment processes, communities are required to incorporate consistent communications and outreach, ensuring that stakeholders of all interests will stay informed and supportive of city projects.

4. Change the negative perception that redevelopment is an inappropriate strategy for the community. The city officials and residents of all Michigan's communities know that their city possesses unique qualities and special characteristics. Participation in RRC helps communities develop effective approaches to marketing that can be used to attract interest from developers, nonprofits and the state and federal government.

RRC encompasses an eight-step certification program, through which cities thoroughly analyze and evaluate their development process from start to finish. These steps include a) passing the Threshold Requirements, b) Initial Evaluation, c) Determine Score based on initial evaluation of internal procedures, d) Make Amendments and Reforms, e) Technical Assistance, f) Final Evaluation g) Award Certification and h) Promotions.

After applying and being accepted to the program, the first major component is completing the Threshold Requirements within 90 days. This step ensures that the city's council, boards and commissions understand the principles of RRC, support involvement in the program, and are committed to improving the city's redevelopment processes. It entails the legislative body (city council) passing a certifying resolution as official policy of the municipality committing to the initial adoption and implementation of the Redevelopment Ready Communities Best Practices. Other decision-making authorities also need to indicate formal recognition and support of the certifying resolution.

Initial Evaluation

After passing the Threshold Requirements, the city begins the evaluation, an informal discussion between city staff and RRC consultants to determine which internal processes need to be changed to comply with the RRC Best Practices. The discussion begins with a thorough assessment of existing city processes and how they are implemented. The final product is an evaluation report highlighting existing strengths and areas for amendments and reform. After the RRC consultants and city staff agree on the targeted areas for reforms, the RRC planning consultant begins work in the city as outlined in a work agreement.

Evaluation Scorecard

The scorecard is a tool used to guide the initial evaluation by helping the RRC staff and city officials identify strengths and areas that need improvement in the development process. A city must achieve a score of at least 80 out of 100 in order to become certified. The scorecard complements the evaluation report by providing a quantitative analysis of a city's development process. Scoring is weighted and balanced between visioning, applications of available tools, and implementation. On average, a city completes the program within twelve months and must seek certification renewal status after two years.

Making Amendments and Reforms

Armed with their evaluation report, score, and feedback from the RRC staff and consultants, city staff set out to make the reforms identified during the initial evaluation. Two types of reform surface after the evaluation and assessment step – those that can be completed by city staff inde-

pendently and reforms that require specific support from a planning consultant. Cities are expected to tackle and complete both types of reforms.

Technical Assistance

The initial evaluation determines a preliminary overall score and individual points awarded under each RRC Best Practice category. This score highlights strengths and weaknesses in the city's development and redevelopment processes, indicating where technical support is most likely needed. In a collaborative effort, the RRC and city staff determines what types of technical assistance will be the most effective to create sustainable solutions for those areas in need of improvement. Once both parties agree on a technical assistance plan, the RRC staff presents the plan to the RRC Committee for comment and approval.

Final Evaluation

The certification evaluator conducts a final assessment and updates the scorecard when the independent tasks and technical assistance is completed. If the city achieves at least 80 points out of the possible 100, the certification evaluator submits a recommendation to the Committee to award RRC certification.

Promotion

The Suburbs Alliance helps cities in the program publicize their achievement by presenting them with an RRC Certification award that can be displayed in city hall, providing them electronic RRC Certified logos to place on community printed materials and the city website, displaying case studies of each city's accomplishments on the RRC program website (www.redevelopmentready.com), sending press releases to key community and regional media outlets, and promoting the RRC program on partner websites.

RRC - The Best Practices

The RRC Best Practices form the basis of the certification program and serve to guide cities through the reform-making process. They were developed over the course of two years by the RRC Committee with the help of nearly twenty national experts on redevelopment, and they continue to be improved upon and republished each year. Each Best Practice has two components, a standard and an indicator. A standard explains a specific requirement that is essential to an efficient, predictable redevelopment process; an indicator is an example of how a community may illustrate its achievement of that requirement. The indicators are meant to provide guidance on fulfilling the standards; however, they are not the only ways cities can demonstrate achievement.

Standard 1: Community Visioning and Education

In Michigan, every municipality is expected to have a Master Plan with an implementation strategy for their community that should be revisited at least every five years. The plan allows communities to identify a vision for the community, including the establishment of long-range redevelopment strategies for older municipalities. Unfortunately, many communities do not frequently ask themselves "where do we want to go"? And "how will we get there?" They may use outdated assumptions regarding population, income, transportation, existing land uses and legislation that do not specifically address redevelopment, making them ill-equipped to respond to development proposals or seek appropriate development for the community.

With every redevelopment project, it is essential local city leaders create focused and consistent public involvement opportunities that inform citizens about the economic and fiscal necessity of redevelopment. Without public support, redevelopment projects can become complicated and drawn out, something no developer wants to experience. Upfront visioning and planning set development priorities that are supported by affected residents

and businesses, providing clear direction and guidance for potential investors and developers. Many communities have basic public engagement processes, but they may be implemented too late in the development process to be effective in attracting new development opportunities.

The redevelopment process should become part of a community's culture through strong public engagement. Cities need to go beyond the basic legal requirements of public hearings, or talking at people to address the community's problems, opportunities and goals for redevelopment. Cities need to embrace public input, encourage developers to engage citizens earlier in the process and reframe how it creates and communicates the city's long-range redevelopment strategies.

Standard 2: Continuing Education for City Officials

Municipal leadership turns over every two to three years through the election cycle. Newly elected and appointed officials that are voted and appointed to new positions typically lack the training and specific knowledge and understanding about key development issues. In many instances, a city is unprepared to appropriately orientate newcomers with immediate training opportunities or even provide an introduction manual instructing what their new responsibilities are. Many cities lack dedicated training budgets for newly elected officials, leaving many individuals unaware how their decisions may impact the local development climate and increase exposure to potential lawsuits.

Adequate and ongoing training for public officials and staff is essential to the efficient and equitable functioning of a community's redevelopment processes. Local officials who are informed about redevelopment processes and available incentive programs and receive regular training to improve their decision making skills have a greater ability to attract significant new investment to the community.

Cities need to create and document a process for ensuring that elected, appointed officials and staff involved in the redevelopment process has received adequate training and technical support to make informed decisions about development.

Standard 3: Tools for Redevelopment

Redevelopment in inner-ring suburbs is significantly different than areas with the natural environment still intact. It is easier and less costly for a developer to invest in land with no prior buildings and infrastructure. Older communities need to recognize the costs that differentiate a redevelopment project from undeveloped land, such as those incurred to mitigate contamination, acquire and combine smaller sites, and replace deteriorating infrastructure.

Municipalities have various state and federal financial incentives available to them to offset the cost of vacant, blighted, and contaminated properties to drive redevelopment opportunities. Local governments must be willing to define and commit to the applicable financial tools to bridge the extenuating circumstances generally encountered. Local governments that commit and express upfront the financial incentives they are willing to use are more likely to attract investors and spur activity on unoccupied property.

Standard 4: Development Regulations

Zoning is the legal tool permitting cities to determine what and where development occurs and supports the community vision in the master plan. In older communities, existing development regulations often prevent communities from executing innovative redevelopment plans that encourage mixed uses and other modern types of development. Consequently, local governments face a disadvantage in attracting new investment, and their ability to impact the development patterns, character and composition of their com-

munities is significantly limited.

Cities need to review and amend their zoning ordinance to ensure that the vision in the Master Plan can actually be implemented. Updating land use regulations to be more modern and flexible can increase the overall efficiency and predictability of a city's development process and produce exciting new redevelopment opportunities.

Standard 5: Marketing of Redevelopment Sites

To facilitate redevelopment, it is essential that cities know what parcels of land are available for redevelopment, provide a site analysis describing existing conditions, identify the desired land use and provide potential developers with a comprehensive list of all redevelopment sites, including both vacant parcels and redevelopment parcels as identified in the redevelopment planning process. Making this information easily available to potential investors online and in city offices will greatly increase a community's chances for redevelopment of these properties.

Standard 6: Redevelopment Plan Review Process

Over the course of many decades, inner-ring suburbs have acquired layers of well-intentioned development review approval requirements such as multiple hearings and reviewing bodies. Many of these requirements are outdated and unnecessarily increase the time and expense associated with development review, threatening to not only slows the development process but also frustrate and even drive away investors.

Redevelopment planning involves responding to evolving circumstances. Often this means pursuing development strategies that depart significantly from the historic standards and procedures that created local communities, as they exist. New strategies are necessary to stem population decline, provide new growth opportunities for increasing the tax base, and foster a diverse economic mix and strong local development climate. Areas of growing abandonment, blight or obsolescence must be repositioned according to societal and market trends. Redevelopment plans take into account changes that describe the kind of actions necessary to restore the vitality to declining areas. A well-defined, predictable and documented process is a vital step in encouraging developers to proceed and participate in redevelopment projects.

Progress and Preliminary Findings

In the 2005 pilot program, five cities have been awarded the RRC status and another six cities are under review in 2007, as shown in Figure 1, at the time of writing (February 2007). Progress with implementing the RRC program has been solid over the two years, yet measurable results have been slower and more difficult to achieve than originally conceived. It is, therefore, too early to measure the impact of the RRC program in terms of specific redevelopment opportunities, applications for development permits or physical construction. The program has, nonetheless, generated significant interest from both local government and the development community.

In terms of preliminary findings, it is clear that the pace of redevelopment in the inner ring suburbs, and across the much of the Detroit metropolitan region, is governed by the condition of Michigan economy. For the past four years, Michigan's economy has grown at a significantly slower pace than the rest of the country, with consistently higher levels of unemployment and lower levels of new job formation. Accordingly, the property market has been struggling, across all sectors. While the rest of the nation experienced significant growth in residential property values and a surge in residential construction, SE Michigan has, in general, witnessed falling property values and a downturn in all sectors of the home building industry. Cities that have streamlined their processes,

have priority redevelopment sites "ready to go", and have RRC status may not have an immediate increase in development activity due to current market conditions. Regardless, the city is prepared to receive new development inquiries when the market improves.

On another level, local administration has limited capacity to fully implement all qualifications that are outlined in the RRC program. All governments in Michigan face three levels of constraint: static, in some places declining, tax revenues; legislative controls over raising the level of taxes; and, increased operating expenses, especially "legacy costs". Accordingly, many smaller units of government have reduced staffing levels, leaving them without the personnel to address the issues raised by the faltering economy. In some instances, one individual may balance all planning and economic development responsibilities on behalf of the city, running from one task to the next, unable to see the bigger picture. Thus, local governments find it difficult to implement and manage the necessary planning, zoning and incentive programs needed to jumpstart the local development process.

One significant impediment that the RRC program needs to address is a lack of market intelligence about development opportunities in the inner ring suburbs. As the program has evolved, staff has identified a mismatch between regional developers and site/property information at the local level. It will be important to find ways to overcome this knowledge gap, and reconnect regional developers and builders with profitable sites and redevelopment opportunities in communities that have been ignored for the past 30 years.

That being said, there is also the challenge of entrenched local cultures. In the local community there is often deep-seated conservatism, a persistent Not In My Back Yard (NIMBY) attitude, and a reluctance to face the realities of socio-economic and physical decline. In local politics, there is parallel distrust of developers and a sense that the community, writ-large, rarely sees the benefits of the redevelopment process. In turn, local developers have been cautious in pursuing redevelopment opportunities, as they perceive community opposition, even hostility to new building, and a development process fraught with barriers and added costs. Moreover, it takes time and significant dialogue between the developer and local officials to persuade developers that there are market opportunities in the inner ring suburbs that can produce profit margins that, hitherto, they have found in the newer suburbs..

Despite these challenges, the RRC program encourages cities to move beyond "this is the way it has always been done" mindset; it's a blue print for a community to follow how and where improvements can be made in their processes. The planning regulations and methods applied to the creation of the inner-ring suburbs post WWII, are no longer effective enough to address the challenges typical of redevelopment projects. Cities want new methods to help them recreate their communities in order to evolve with the changing economy and to meet the needs of how people want to live. Through the RRC program cities are required to look inward to evaluate how they are growing, develop a community vision that city leadership commit to, identify priority redevelopment sites, and stick to the plan.

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6.5 Strategies and instruments to limit excessive land use in Germany - a proposal to the German Council for Sustainable Development

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ABSTRACT

In the year 2004, the German Council for Sustainable Development (CSD) published recommendations on how to achieve the "goal-30-ha" of the Federal Government of Germany. The "goal-30-ha" is a political intention and should eventually lead to a reduction of the daily growth of area for settlement and transport from 100 ha today to 30 ha by 2020. In 2006, an evaluation of the recommendations was completed and the results are presented here. The investigation consisted of a desk research, a poll in the internet and three workshops with experts. The results of the poll and the workshops represent the full scope of opinions and of assessments from various professional audiences on the CSD recommendations. The surveyed experts believe that municipal area management, recycling management and regional cooperation are the most important elements for a successful implementation of the reduction goal. However, the workshops revealed the scepticism of the experts concerning the feasibility of goal management and of using economic instruments, in particular tradeable planning permits (land certificates).

Introduction

In the year 2000, the area for settlement and transport in Germany increased daily by 131 ha; from 2000 to 2002, this daily growth declined to 105 ha mainly due to the economic situation (Bundesregierung 2004). In 2006, the growth was still about 100 ha per day (Bundesamt für Bauwesen und Raumordnung 2006). The "goal-30-ha" is a political intention, which is based on the "sustainability strategy" of the Federal Govern-ment of Germany, where the increase of the settlement area per day was defined as one of 21 sustainability indicators (Bundesregierung 2002). This "goal-30-ha" means that the land consumption in Germany should be reduced to 30 ha per day by 2020.

In 2004 the Federal Government commissioned the German "Council for Sustainable Development (CSD)" to organize a dialogue with and in the professional public in order to develop recommendations for actions, strategies and instruments to achieve its "goal-30-ha". As a result of the dialogue process, the council published its recommendations (Rat für Nachhaltige Entwicklung 2004).

Two years later, in 2006, the council itself commissioned Dialogik gGmbH Stuttgart (Prof. Dr. Ortwin Renn) in collaboration with Nürtingen-Geislingen University, Institute of Applied Research (Prof. Dr. Alfred Ruther-Mehlis) to evaluate its recommendations and the effects that the political programme "goal-30-ha", on the one hand, and the recommendations, on the other hand have achieved so far (Ulmer et al. 2007). The main results of this evaluation are presented in this article.

Land use planning in Germany

In Germany there are four planning levels: the municipal, the regional, the fed-

eral state and the federal level. The spatial planning act (Raumordnungsgesetz – ROG 1997) provides the framework for spatial order and planning. The federal states make this framework operational through a federal state planning act. They are responsible for the federal state development programmes, where the main functions of different areas and the objectives of the federal state spatial planning are described. Each federal state consists of several planning regions, which work out regional plans with guidelines on the regional planning structure. These guidelines should be taken into consideration on the local level.

Despite these regulations provided by the higher planning levels, the local level still has considerable power in Germany. The Basic Constitutional Law of the Federal Republic of Germany, and inspired by this constitutional framework, the spatial planning act, guarantee local planning autonomy. The building law (Bauge-setzbuch – BauGB 2004) regulates the land use planning on the local level. The current version of this legal framework contains a soil conservation article and a powerful link to the nature conservation act (Bundesnaturschutzgesetz - BNatSchG 2002), which requires the compensation of an environmental impact in the case of building measures. Because of this complex construction, land use planning in Germany is a continuous appreciation process of different interests.

A further aspect, which leads to even more complexity, is the municipal finance system. The income of a municipality consists mainly of a series of taxes like the land tax (Grundsteuer), the land acquisition tax (Grunderwerbssteuer) and the trade tax (Gewerbesteuer). Therefore simply economics aggravate the problem of excessive land use for settlement and transport: the more inhabitants and business companies a municipality gains the more income it gets. Some taxes, like the land tax and the trade tax, are direct taxes to the municipalities. Other taxes, like the land acquisition tax, are reallocated by the federal states via a municipal financial equalization system (kommunaler Finanzausgleich).

The CSD recommendations

The Council for Sustainable Development (CSD) worked out recommendations for the Federal Government to resolve the problem of land consumption based on a communication process with professional audiences (Rat für Nachhaltige Entwicklung 2004). This text clarified that the "goal-30-ha", first of all, had to be understood as a symbol of sustainable land use in the future and not only as a quantitative aim. Concerning actions, strategies and instruments, the text was classified in the sections "new overall concepts for a sustainable urban development", "new goal management", "other actions of the Federal Government" and "continuous land use dialogue".

Important aspects of the **overall concepts** should be the acceptance and management of settlement boundaries, and simultaneously, the safeguarding of the local planning autonomy. Moreover, the cooperation between neighbouring local authorities and a municipal area management that is capable of reaching social and ecological aims should be aspired.

Concerning new **goal management**, the CSD recommended to the Federal Government to introduce a new element into the spatial planning process: a planning obligation. Such a measure would require an amendment of the spatial planning act (ROG 1997). The amended act should prescribe that the federal states lay down a spatial planning programme with guidelines on minimum targets concerning the reduction of land consumption for settlement purposes. But it should also clearly state the obligation of the federal states to give an account of their land consumption.

A second important aspect of goal management from the point of view of the CSD

was the idea of the internalization of all kinds of life-cycle costs of the infrastructure, as well as of ecological and social costs of an expansion of the settlement area. Recycling of derelict land and the improvement of the environmental impact assessment according to the nature conservation act in the case of building projects (BNatSchG 2002), should be further elements of new goal management, which includes aspects of quality.

In the section "**other actions of the Federal Government**", the CSD suggested fiscal actions, the reform of subsidies and the amendment of the building law. Tradeable planning permits were mentioned by the CSD, but not yet recommended as a strategy because of unsolved problems related to this economic instrument.

The last section clarified that one of the most important objectives is a continuous **communication process** on all social levels and the development of public awareness of the problem.

Questions and methods

The investigators were asked to provide answers to the following questions:

1. Are there any measurable effects of the political programme "goal-30-ha" and of the CSD recommendations?

2. How do experts think about the political goal, the CSD recommendations and their effects?

3. Which strategies, instruments and actions would the experts recommend for approaching the "goal-30-ha"?

The investigations started in summer 2006 and were finished with a final report in December 2006. In order to check any effects of the political goal and of the recommendations, as well as inquire into the opinions of experts on the CSD recommendations, three different investigations took place and started one after another:

1. The first step was an internet-based desk research of the current programmes, projects and activities aimed at reducing the high level of land consumption. It addressed the first question mentioned above. The other important purpose of the desk research was to find experts (e. g. policy makers, members of the scientific community and of planning authorities, as well as of planning companies) who would participate in the work-shops (step 3).

2. The second step was a poll in the internet to members of different professional audiences such as landscape architects, political analysts, planners and lawyers.

3. The last step was to plan and conduct three workshops with experts who were found during the desk research.

The answer to the first question can be briefly summarized by stating that there are indeed some measurable effects. At the moment, in Germany, a lot of programmes and projects at the federal level and at the federal state level are trying to contribute solutions to the problem. The great response to the poll and the interest of the experts in participating in the workshops reflect these activities on different levels.

Poll in the internet

The poll in the internet took place between September 9, 2006 and October 20, 2006. During the desk research, about 1000 people belonging to the selected professional audiences were contacted by e-mail. 8000 people were informed by news-letters and mailing lists in particular of the CSD and Dialogik gGmbH. Furthermore, the CSD directed the people interested in the land management patterns to the poll on its website. 404 people responded to the internet questions.

Workshops with experts

The selection of experts for the workshops was a result of the desk research. Professionals (scientists, policy makers, planners, represen-tatives of administration and of NGOs) who were engaged in questions of land use management were invited. Altogether 60 experts participated in the workshops.

In workshop 1 and 2 the method "group delphi" (Webler et al. 1991) was applied as a means to measure the distribution of opinions on the CSD suggestions and to elicit a solution that would be agreeable for all sides. For this purpose, statements were formulated for the discussion (s. figure 1). The experts were asked to assess the goal achieving potential of certain instruments or measures and to voice their agreement or disagreement with measures recommended by the CSD or by the majority of the participants of the poll. They were requested to rank their opinion on a scale of 1 to 10. Working groups of 5 or 6 members discussed the issues and were asked to find a consensus wherever possible. In a plenary session the results of the working groups were presented. In the case of dissent the arguments were put forward to all workshop participants.

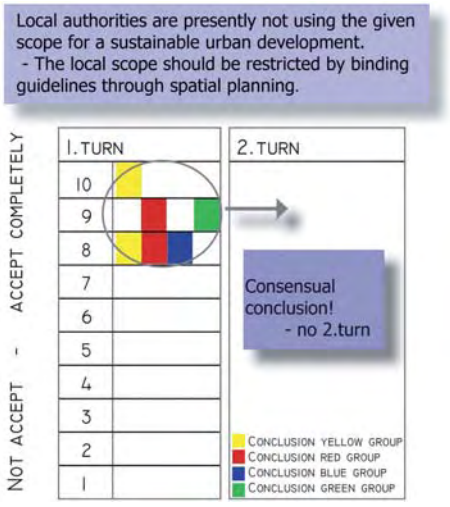

Figure 1: Example of a delphi statement and of a delphi valuation

Those statements where even in the plenary discussion a consensus could not be found were discussed once again in newly arranged working groups. The overall result of the delphi workshops was the knowledge about the distribution of consensus and dissent of the experts on strategies, measures and instruments to limit land consumption in Germany.

The analysis of the two delphi workshops led to domains of measures, which seem to have a high goal achieving potential. These domains were objects of discussion and further specification in the third workshop. In addition to the documentation of the discussions, workshop 3 offered a visualisation of the expert opinions concerning the goal achieving potential, the social acceptance and the feasibility of the different measures, instruments and strategies. In each case, the participants had to distribute 10 points for goal achieving potential, social acceptance and feasibility.

Results

The poll and the workshops showed that even the "goal-30-ha" itself has been discussed controversially among the professional audiences. Of the poll respondents, 34% believe that this goal could not be achieved by 2020. Nevertheless, 81% of those respondents think that such a political goal is necessary. In the delphi workshops a quantitative reduction goal at the federal level met the approval of the majority of the participants mainly because of its value as a political symbol. Some participants of the third workshop challenged this effect. Their arguments were: publicity for the "goal-30-ha" is difficult because it has no direct relevance for the individual citizen and his land use patterns, it is not possible to measure whether the goal can be achieved by 2020 and finally, there seems to be no way to make it obligatory. As a result of the delphi workshops, 9 domains of measures with a high goal achieving potential were identified (s. figure 2).

Figure 2:
Domains of measures with high goal achieving potential according to the results of the delphi workshops

More specifically, the visualisation of the expert opinions of the third workshop concerning the goal achieving potential, the social acceptance and the feasibility of the measures, instruments and strategies is shown in figure 3. The graph illustrates the opinions of the experts regarding the importance of the domains "municipal area management", "communication" and "recycling management of derelict land in urban areas in accordance with the requirements of full ecological cycles (Flächenkreislaufwirtschaft)" which is short-ly named "recycling management". Figure 3 also shows that the workshop participants gave specific advices to the domain "(municipal) financial equalization".

The following presentation refers firstly to the contents of the main sections of the CSD recommendations (new overall concepts, goal management and communication). Secondly, it deals with the subject "economic instruments" because the poll revealed the hope of the respondents that those instruments could have a very high goal achieving potential. Because of this result, economic instruments were investigated in particular detail in the delphi workshops.

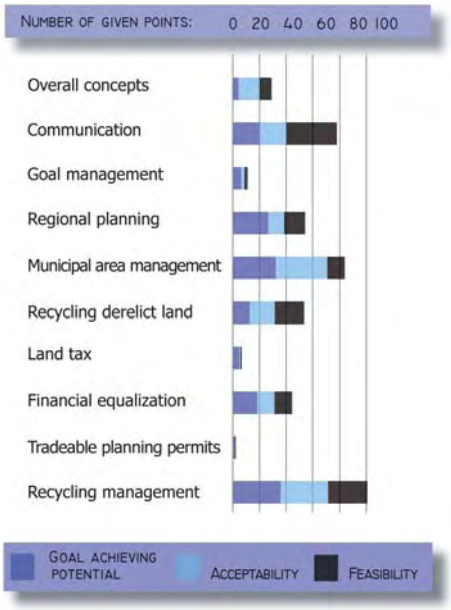

Figure 3:
Visualisation of the opinions of the experts of workshop 3 regarding the importance of different domains of measures

Opinions of the experts on the CSD recommendations

New overall concepts

Overall concepts without specification on the municipal level were declared useless. The discussion of overall concepts, understood as a democratic, integrative and participative process, was seen as a precondition to a change of public consciousness. Furthermore, the overall concepts should be mandatory so that actions must follow.

The experts agreed that **municipal area** management is one of the most needed instruments to be integrated into a new concept. Most of the workshop participants expressed the opinion that the introduction of such a management system should be a voluntary action of a municipality

and could not be dictated. Others pointed out that the building law (BauGB 2004) includes the directive of a building zone register, which is an important element of a management system. Furthermore, a municipality should work together with owners and investors and should act as a vendor of derelict land, if necessary. The probability of an implementation of this instrument in the municipalities was not prized by the experts because of the high expense to be carried and because of possible communication problems within the municipal administration. Moreover, the experts emphasized the necessity of the active cooperation between municipalities, for example, concerning a cooperative management of com-mercial areas.

In the description of demands on new overall concepts, the CSD indicated the conflict between the local planning autonomy and the necessity of limitation of the local scope. Nevertheless, the CSD favoured maintaining the local planning autonomy. The workshop discussions underlined this cardinal conflict, which has its roots in the spatial planning act (ROG 1997) and ultimately in the Basic Constitutional Law of the Federal Republic of Germany. Some workshop participants shared the opinion, that more legal **regulations at the regional level** should be introduced to limit the scope of the individual municipalities. Others argued that, because of the judicial deep-seated local planning autonomy, only the voluntary commitment of a municipality to limit excessive land use could be a promising solution.

Goal management

As the two delphi-workshops showed, the majority of the experts thought that **quantified reduction goals** in particular on the regional and local level, and in this context the limitation of the local planning autonomy, are measures of a high goal achieving potential. In agreement with the CSD recommendations, this new goal management should be adopted by the spatial planning act (ROG 1997). However, the experts doubted that these claims will be legally enforceable.

During the third workshop, the participants of one team made the idea of goal management operational. From their point of view, the responsibility for the implementation of goal management must be assumed by the municipal-lities, which are organized in one planning region. They are obliged to make a fundamental decision concerning quantified reduction goals on the regional level. The planning region then should be responsible for controlling the process and the outcomes. The workshop experts suggested goal management should include up to ten main quantitative and qualitative goals on the regional level. The detailed elaboration must be done on the local level. The members of the expert team were convinced of this strategy, but they did not believe that this proposal would be enforced on the political level.

The **internalization of life-cycle** costs of infrastructure, as well as of ecological and social costs of land use, was declared to be an important idea and a necessary part of goal management. The poll in the internet and the delphi workshops showed that this idea has been rated as very complex to the extent that no conclusive assessment would pop up.

In the two delphi workshops, **recycling of derelict land** was declared as an instrument with a very high goal achieving potential. Two-thirds of the poll participants were aware of a recycling project. In the third workshop, recycling of derelict land and especially the problem-solving approach "**recycling management** (Flächenkreislaufwirtschaft)" (Federal Office for Building and Regional Planning - Bundesamt für Bauwesen und Raumordnung 2006) were discussed in a more detailed way. Recycling management was defined as every kind of reutilization of formerly used sites. Even temporary use and renaturation of a field should be taken into consideration as possible options. A register of derelict land should be

an instrument of planning and controlling the recycling process. Funds could help to accelerate the revitalisation and public relation activities are needed to highlight the advantages with regard to quality of life aspects of best practice examples. The economic and judicial insecurities and liabilities were considered to be problems in the revitalisation activities. In spite of these obstacles, the "recycling management (Flächenkreislaufwirt-schaft)" was declared to be a promising overall strategy with a high goal achieving potential and a high feasibility. This strategy should dominate the content of new overall concepts. Municipalities should introduce registers and funds, regional governance should manage the cooperation between neighbouring local authorities. The main goal must be the integration of derelict land into a qualified inner development of urban areas.

The **improvement of the impact assessment of building projects**, which was a fourth aspect of goal management from the point of view of the CSD, was discussed controversially. Some experts shared the opinion that this instrument of the nature conservation act (BNatSchG 2002) helps to minimize a growth of the settlement area in an indirect way because municipalities have to pay money for compensation measures. In order to reduce the costs, they would try to avoid building measures. Others were sure that the impact assessment would mainly lead to the protection of ecologically valuable areas but would not contribute to the quantitative reduction goal. The goal achieving potential of the instrument was classified as medium in comparison with other measures. A second important aspect of the discussions was the method for compensating the sealing of soils. Resealing of another area as an adequate compensation measure is not practiced frequently so that the instrument would not contribute directly to the achievement of the reduction goal. Instead of resealing, in most cases, soil melioration measures take priority.

Communication and public awareness

The majority of poll respondents believed that the common public and the representatives of the mass media in Germany have nearly no awareness of the land consumption problem. About half the respondents thought that the consciousness of the politicians is in low gear. This result underscores the importance of a new communication strategy. The workshop participants shared the opinion that a communication strategy and the development of new overall concepts are closely connected and very important. Especially schools, journalists and municipalities were mentioned as important target groups. Nonetheless, they did not expect that public awareness of the ecological functions of soils could be considerably raised by public relation activities. In order to improve public acceptance of a change, the experts proposed a communication strategy which underlines the positive aspects of high-quality inner development of cities and villages, and which minimizes the communication about the complexity of the problem. They also recommended the target-group specific transfer of knowledge about excessive land use and the connected ecological, economic and social relationships. Another important component of a communication strategy should be the direct contact with representatives of the municipalities as the most important players. A helpdesk for municipalities should be established.

Economic measures and instruments

Of the poll respondents, 68% think that "economic measures" have to be taken to solve the problem. In the workshops, the introduction of new taxes, grants and licenses, as well as the abolition and reform of existing ones, with regard to achieving the "goal-30-ha" was discussed in detail.

One of the results of the poll and the workshops was that economic instruments with a high goal achieving potential seem

to be difficult to enforce because they are not socially accepted. Reforms would be very complex and would have to be handled with care because the interactions between various economic measures and other sustainability goals must be kept in mind. The reform of the municipal finances seemed to be a very important step, but at the same time difficult to implement and facing lack of social acceptance.

There was no consensus about the importance of **financial incentives**. Some experts thought that the development of public awareness of the problem is much more important than financial incentives. Others pointed out that successful revitalization projects could be promoted by financial support. A dispute took place about the problem whether **taxes** on land use and sealing as indirect negative incentives are more or less efficient than **grants**, which could act as direct positive incentives.

The CSD recommended the abolition of the land acquisition tax (Grunderwerbssteuer), especially in the case of intermediate municipal acquisition and the reform of the land tax (Grundsteuer). The land tax system should be revised so that occupying new land on greenfields would be more expensive than the redevelopment of formerly used sites in the inner zone. There was no consensus about the goal achievement potential and the feasibility of these measures. The workshop participants discussed the introduction of new taxes. One proposal was the levy of a land tax in a planning region, which should be reinvested into revitalisation projects in the same region. Some experts proposed municipalities should pay taxes to the federal state level or to the national level in the case of new land use. The experts of the third workshop recommended the financing of revitalisation and renaturation measures through the municipal financial equalisation system.

Concerning the abolition or introduction of grants, most experts thought that carefully directed financial support of the inner development of a city is an important measure. They believed that the abolition of existing grants (for example federal subvention for private homebuilders) has only a low goal achieving potential.

Tradeable planning permits (land certificates) have been discussed in the last years in Germany as a promising instrument. The CSD only recommended further investigations. Whereas economists are convinced of the optimal goal achieving potential, the instrument of permits was contested from a judicial point of view. Critics pointed to the conflict with the local planning autonomy or challenged whether a permit solution would lead to a real change of consciousness because of the possibility of using land for settlement purposes up to a certain target. This controversial discussion also took place in the delphi workshops. In the third workshop, the feasibility of the instrument was assessed as very low because the allocation of the contingents seemed to be a problem which is difficult to solve consensually.

Main recommendations of the experts

These are the most important recommenddations of the workshop experts:

- The qualitative implications (quality of the soils and the landscape, quality of life in urban and rural areas) of the political programme "goal-30-ha" should be specified in more detail and clarity because the goal is not obvious in itself.

- The regional planning level should be strengthened and regional cooperation should be encouraged. Most of the experts share the opinion that the spatial planning act (ROG 1997) must be amended in order to mandate goal management and the obligation to introduce municipal and regional area management systems. The municipalities of one planning region have to make a fundamen-

tal decision concerning quantified reduction goals, and the planning region should be in charge of the realization of it. The CSD should give advice regarding the goal management strategy during the amendment process of the spatial planning act, which will be accomplished in the near future. In conclusion, a combination of cooperative municipal and regional area management was recommended by the experts. The strategy of a recycling management (Flächenkreislauf-wirtschaft) should be integrated in the overall concepts. Start-up financing programmes could help to initialize the cooperation and management approaches in model projects.

- The municipal area management should be communicated to the head organisations of the municipalities like "Deutscher Städtetag (Association of German Cities and Towns)" and "Deutscher Städte- und Gemeindebund (German Association of Towns and Municipa-lities)". A helpdesk for the purpose of counselling municipalities in all questions of management should be established. In order to strengthen a municipal management approach, it should have its basis in the building law and the federal states should give financial incentives.

- The CSD should check if it is possible to develop an overall strategy which can be recommended to the Federal Government. This overall strategy should mainly include the most promising measures and instruments, and should take into account the inter-dependences of the different parts, as well as a time table until the year 2020. The CSD should prioritize and specify the recommended measures in the overall strategy.

- The experts pointed out that regional disparities in Germany have to be taken into account for problem-solving approaches to be efficient. Shrinking regions have to act differently from growing regions.

- Finally, the CSD was asked to act as a promoter of networking with and between the local and regional players, as well as with business representatives, journalists and schools. The council should also integrate considerations at the European and international level.

Conclusions

The results of the investigation confirm the need for evaluation of the goal-30-ha and of the CSD recommendations. Two years after the publication (Rat für Nachhaltige Entwicklung 2004) it is obvious that an overall strategy including the prioritisation and specification of measures have to follow in order to approach the quantitative and qualitative implications of the reduction goal. The investigations underline, on the one hand, the importance of planning at the municipal level, and on the other hand, the needs of strengthening the regional planning level. The implementation of goal management could take place through voluntary commitments of the municipalities and through amendments of the spatial planning act. The local players are the most important target group for a communication strategy. The Council for Sustainable Development was advised to initiate a broader and intense discussion about the need for integrated concepts on the local level in order to contribute to a change of consciousness. Active municipal area management, communi-cation and cooperation within and between municipalities and regional area management approaches constitute the main components of the desired concept. The workshops revealed a deep-seated scepticism of the experts concerning the feasibility of goal management and of using economic instruments. However, the strategy of a recycling management (Flächenkreislaufwirtschaft) was declared a promising problem-solving approach.

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6.6 Ineffective and Uncoordinated Urban Land Use management in Developing World: the case of Akure, Nigeria

Afolabi Aribigbola

ABSTRACT

This paper explores urban land use management practices in Akure, Nigeria with the aim of determining its effectiveness. It discusses the implications of uncoordinated land use management and constraints to land use management in the city

The paper draws on a systematic survey of land use mechanisms and activities, departments and agencies of government responsible for land management and land owners in the study area.

The paper revealed that land use management in the city has been mainly concerned with the granting of statutory right of occupancy and approval of plans to use land without monitoring the outcomes of such approvals. It also shows that land management and control tools are either not available or weakly implemented, and that land management is disjointed and uncoordinated since several organizations and agencies are involved without a coordinating agency or an overall land use plan within which effective land use management can be undertaken.

Introduction

Land is a major factor of production and a vital element in the socio-economic development of any country or society (FMH&UD, 2006). According to Oyesiku (1997), the forms and patterns of distribution of structures in general to promote the good health, accessibility, convenience and harmonious land use in environment are a function, to a considerable extent, of the rights and methods of dealing with land.

Thus, effective urban land control and management particularly in areas with rapid urban sprawl such as Nigeria is crucial to tackling growing land use problems such as slum formation, rising costs of land, accessibility to urban land for land housing, incompatible use, flooding, overcrowding and congestion among others for the purpose of achieving sustainable city development and ensure the safety and health of the people. Thus, great attention has been paid by researchers, professionals and decision makers to the urban land management problems and the design of policies to combat it. In Nigeria, a number of policies that impinge on urban land management has been articulated and implemented. These include the Land use Act of 1978, urban Development Policy of 1992, Urban and Regional Planning Act 1992 as well as the Housing and urban development policy of 2002. Despite the existence of these laws and policies, urban land use management problems still persist in Nigeria

It is against the above background that this article seeks to examine land use management practices in Akure, Nigeria with a view to determining its effectiveness as well as highlights the major constraints to efficient land management in context of developing world urban setting using Akure, the capital city of Ondo state, Ni-

geria as a case study.

Conceptual Framework and Relevant Literature

Land is required for various uses in both the urban and rural areas of all society. As nations grew in size and rural areas become urban centres and urban centres become large metropolitan areas, there is always increased competition as well as demand for land for different purposes. This requires adequate planning and control to ensure harmonious development and functional efficiency of these uses and settlements. Conceptually, the Von Ludwig Bettalanffy's (1971) General System Theory provides an appropriate framework for comparing the mutual interdependence of land policies, sustainable development and integrated land use management systems. Akin to the General Systems theory where everything affects everything else are the trans-boundary effects of local and regional policies on land and allied resources, which today have assumed remarkable currency. Consequently, local policies are no longer viewed in their isolationist context, but within the broader framework of constraints and opportunities afforded by the 21st century information technology. As a common factor and denominator in the framing and execution of the social and economic policies of nations, Racticliffe (1976), was of the view that the allocation, use and management of land should be done to guarantee access and equity, which the Land Use Act (1978), aimed to achieve in Nigeria. In particular, population increases arising from uncontrolled natural births and rural-urban migration, and a growing commercial sense, have combined to re-orientate the traditional communal land holding status of the Nigerian lands (Ola, 1983).

Irrespective of the varying attitudes of land, it is imperative that policies be directed towards land to provide the cross-cutting for streamlining and aligning all the countervailing forces affecting its disbursement and management. From the planning perspective, land represents a mosaic that ought to be regulated to ensure conformity and balance of the built environment (Bailey, 1975; Raticliffe, 1976). However, the general inefficiency associated with majority of the developing countries' land policies, and the absence of secure tenure, adequate land management capacity, among others, have been cited by Bernstein (1994), Hardoy and Satlerwaite (1989), as serious problems precipitating existing land crises in these countries. Inappropriate instruments and weak institutional structures are among the cavalcade of problems plaguing the commodity. However, the existence of crises in the Nigerian land market is paradoxical, if not an anathema, judging from the whooping 913,072.64s kms of land that lay to be shared among the estimated 140 million Nigerians (neglecting the hills, rivers, swamps, and other uninhabitable areas). Nonetheless, the existence of crises in the Nigerian land market could be traced to the following factors according to Bernstein (1994); rapid and uncontrolled migration, natural increase and urbanization, existing socio-cultural cleavages, lack of secure tenure, Inadequate information, Inappropriate and inefficient land policies and instruments,weak institutional structures and Lack of land management capacity, among other factors.

In Nigeria, there is still strong adherent to the conventional land use planning approach. Most major cities including Lagos, Kaduna, Port Harcourt, Onitsha, Enugu, Aba and some in other parts of Niger Delta region have been developing with the conventional land use approach (Jiboye, 2005). This has generated diverse urban problems manifesting in the form of deterioration of cities into slums, pollution, congestion, unsanitary condition and epidemics. Nigeria cities are reputed to be the dirtiest, most unsanitary, least aesthetically pleasing and dangerously unsafe for living (Agboola 2002). They are characterized by non-functioning infrastructure facilities, most poorly governed, intensively dotted with illegal structures

while physical growth and development of the cities had not been properly managed or controlled (Aluko 2000). According to Falade (2003), land use plans for most cities often seek to make life better for the masses living in cities as a major goal, but the reality of the case is that these lofty and laudable goals are never achieved. (Falade, 2003). Thus people in urban areas wallow not only in abject poverty, but they also do not live in planned urban areas, which are "orderly safe, convenient and healthy living environment' that is promised as the gains of land use planning (Falade, 2003; Baba, 2003).

The Study Area and Methods

Akure is a traditional Nigeria city and like other traditional Yoruba towns in the country, it existed long before the advent of British colonial rule. The city is located within Ondo State in the South Western part of Nigeria. It lies approximately on latitude 70 151 North of the Equator and longitude 50 151 East of the Greenwich Meridian. Akure is a medium- sized urban centre and became the provincial headquarter of Ondo province in 1939. It also became the capital city of Ondo State and a Local Government headquarters in 1976. The city's morphology has changed over time to assume its present status with its attendant land use problems, as experienced in similar medium sized urban centres in Nigeria. Akure is located approximately 700 kilometers South West of Abuja, the Federal Capital of Nigeria and about 350 kilometers to Lagos the former capital of Nigeria. It is located within the tropical rain forest region of Nigeria where rainfall is high throughout the year. The population of the city grew from 38, 852 in 1952 to 71,106 in 1963. Its population was estimated to be 112,850 in 1980 (DHV, 1985). The 1991 national population census however, put the population of Akure at 239,124 and its estimated population in 1996 was 269,207 (NPC, 1996). At present the city is estimated to have over 350,000 people.

The paper draws on a systematic survey of land use mechanisms and activities, departments and agencies of government responsible for land management as well as individuals involved in land use activities including land owners in Akure. In addition, other relevant materials and data were sourced from published sources such as the Akure master plan (1980-2000), Revised Akure Master plan (1998), journal articles, newspaper, textbooks and internet among others.

Land Management Policies and Regulations in Akure

Formal land use planning and management in Nigeria began in 1863 with the enactment of the Town Improvement Ordinance by the colonial government (Federal Government of Nigeria, 1863). The ordinance was meant to control development and urban sanitation in Lagos, then the federal capital of Nigeria. However, modern planning could be said to begin in the country in 1946 when the Nigerian town and Country Ordinance was enacted. Western Region where Akure was located enacted its own Town and Country Planning law that forms chapter 123 of the laws of Western Nigeria. This law among other provisions established Town Planning Authourities (TPAS), which were to control and guide the orderly development of the settlements within their jurisdiction by approving proposals for physical development and the preparation of development schemes and land use plans (Olujimi, 1993). In March 1979, as a result of the poor staffing situation and non-availability of a staff pension scheme, Ondo State government abolished the Area Planning Authourities (APAs) including Akure Area Planning Authority. In its place, a unified town planning control system was adopted which centred all town planning activities in the Town Planning Division of the Ministry of Lands and Housing. Following the centralisation of planning in Ondo State in 1979, the responsibility of planning Akure was taken over by the state government and the Town Planning Division (now Depart-

ment of Urban and Regional Planning) of the Ministry of Works and Housing. As a result of the need to guide and control development of the city as a state capital and to also cope with the rapid growth of the city, a private planning consultant was commission by the state government to prepare a master plan for the city. The plan that covers the period 1980 – 2000 was completed in 1983.

There were no coherent and comprehensive land policies for Nigeria before the Land Use Act of 1978. the entrance of the Land Use Act on to the Nigerian land scene was essentially to remove the obvious serious inequality and insecurity associated with the land tenure system (Ola, 1984), and to facilitate an arrangement that would revolutionize the country. Under the land tenure system of the precolonial regime fragments of individual, but greater communal, interest existed in land. Government and individuals approached communities for land for farming, housing or planning services etc., with all the socio-cultural implications.

With respect to strategic Town Planning services, such as the preparation, implementation and management of planning schemes, however, the Town Planning Ordinance gave the planning authorities the power to expropriate lands for the preparation of planning schemes, (and to compensate for the expropriation), and wide powers too, to regulate the manner and type of developments on the schemes in order to ensure that lands are used and developed in the best planning principles.

The land use decree 1978 was instituted to achieve a number of objectives prominent among them was to solve the problems of lack of immediate availability of land for use when required by all concerned; curb the activities of land speculators. In sum it was introduced to remove bitter controversies resulting, at times in the loss of lives and limbs, which the land is known to be generating, streamline and simplify the management and ownership of land in the country, assist the citizenry, irrespective of his social status to realize his ambition and aspiration of owning the place where he and his family will live a secure and peaceful life, and enable the Government to bring under control the use to which land can be put in all parts of the country and thus facilitates planning and zoning programmes for particular use

By the promulgation of the decree, in Nigeria in 1978, ownership and management of land was transferred to the government from individuals and communities in which hitherto resides ownership and control of land.

Another important area of government policy that impinged upon urban land management, relates to the articulation and implementation of housing and urban development policy. Public intervention in housing in Nigeria began in the colonial period following the outbreak of bubonic plague in Lagos in the 1920s. During the period 1900 to 1960 government involvement was centered essentially on the provision of quarters for expatriate staff and for selected indigenous staff. In order to address the growing housing shortages and affordability problems in Nigeria, in recent times, a number of housing policy initiatives have been articulated and introduced. The National Housing Policy launched in 1991 had as its ultimate goal, ensuring that all Nigerians owned or had access to decent housing accommodation at affordable cost by the year 2000AD. The main objective of the policy was to make the private sector the main vehicle for the organization and delivery of housing products and services (Yakubu, 2004). The 1991 Policy created a two-tier institutional financial structure, with Primary Mortgage Institutions (PMIs) as primary lenders and Federal Mortgage Bank of Nigeria (FMBN), as the apex institution with a supervisory role over a network of the PMIs was established. Under the 1991 housing policy, responsibilities were assigned to the three tiers of governments and other agencies and parastatals

such as FMBN, FHA, State Housing Corporations, Ministries and Departments. It should be added that at target year of the policy (i.e. 2000), that the policy could not make the anticipated impacts on the built environment as a result of some factors associated with inadequacies of the PMIs, lack of access to land and title to land and problem of mortgage loan affordability among others (Okewole and Aribigbola, 2006). The recognition of the growing housing problems in both the rural and urban areas of Nigeria and the acceptance of the failure of the expired 1991 National Housing Policy prompted the federal government of Nigeria to set up a 15- Man Committee to review existing housing policy and articulate the New National Housing Policy (NNHP) of 2002. The 2002 NNHP has as its primary goal of ensuring that all Nigerians own or have access to decent, safe and sanitary housing accommodation at affordable cost with secure tenure through private initiative, that is Real Estate Developers on the basis of mortgage financing. In sum, there is disengagement of public sector in housing provision to that of private. In addition to the above, and in recognition of the acute shortage of residential accommodation in some major cities in the country such as Lagos and Abuja, and in order to facilitate actualization of the policy, the federal government introduced some intervention measures commencing with a pilot project that involve the construction of new forty thousand (40,000) housing units per annum nationwide with at least 1,000 units in each state of the federation, 1,500 units in Kano and River states, 2,000 units in Lagos State and 3,000 units in Abuja. One unique aspect of the housing and urban development policies in Nigeria the policy made it mandatory for states and local governments to create sites and services plots that are to be sold to members of the public. Besides the policy recommended a review and amendment to the land use decree. However, field investigations revealed that Akure South Local Government where Akure is situated did not discharge this function

In Ondo state, the states housing and land policy that seeks to improve the housing infrastructure and delivery by eliminating a number of problems including shortages of housing and access to land among others was articulated (Ondo State, 2005). Other policies that relate to land management in akure include the sites and services programme, the infrastructure fund IDA project and urban Renewal and Slum Upgrading programme.

Land management Practices in Akure

All the three tiers of government – federal, state and local – are involved in land management in Nigeria in most cases through their agencies. This section will be concerned with identifying and discussing agents of land administration and management in Akure. The responsibility for controlling and managing land in Akure rests on ministry of works lands and housing. The task is undertaken by three departments of lands services, Urban and Regional planning and Surveying. Investigations revealed that there is within the ministry land use and allocation committee created by the land use act for the purpose of allocating lands to desiring members of the public. This committee as found from the field is not in existence in Ondo state. Therefore, the responsibility of allocating land is now being discharged by the commissioner for works on behalf of the Governor. Field investigations shows that the three departments mentioned above performed different functions in land administration and land management. For instance Land Services is headed by a Director and the department is responsible for managing government land and estates, acquire land for public use and land allocation. It should be noted that the activity of the department in the area of land allocation is limited to government land which account for less than 10 percent of urban land use in Akure. However, the department is responsible for issuing certificate of occupancy to land owners and users. It is also

responsible for land acquisition for public use.

Land is required for various uses in both the urban and rural areas of all society. As nations grew in size and rural areas become urban centres and urban centres become large metropolitan areas, there is always increased competition as well as demand for land for different purposes. This requires adequate planning and control to ensure harmonious development and functional efficiency of these uses and settlements. To achieve this fundamental and acceptable activity, layouts of various land uses such as residential, commercial. Industrial, open spaces and recreation, circulation and institutional uses among others are undertaken to standardize and control physical developments and ensure harmonious developments. To ensure adequate provision of this uses and meet the needs of users of urban facilities and services land allocation and space standards are also specified in the literature. Thus zoning of land use, subdivision regulations and layout preparation are instruments that are used to manage land use in Akure. Field investigations revealed that of all these methods, layout preparation is the most widely used in the city to manage land.

In Akure as indicated earlier one of the instruments for land management in the city is the use of master plan that shows the details of how land is to be used in the city. Table 1 shows the responses of residents of Akure about their knowledge of master plan prepared for the city. Analysis of the table shows that majority of the sampled population are unaware of existence of Akure master plan. The implication of this result is that individuals that are unaware of plan that is supposed to guide and control land uses around them give credence to the fact that master plan has not been an effective tool for land management in the city, In addition field investigation revealed that the only master plan prepared for the city was not faithfully implemented.

Table 1: Respondents Awareness of Existence of Akure Master plan
Source: Authour's Field survey, 2006

S/No	Awareness	Frequency	Percentage
1	Aware	243	19,2
2	Not Aware	1007	79,5
3	Others	16	1,3
	Total	1266	100

Beside the preparation of master plan for the city, another major instrument for land management in the city is the use of layout, where parcels of land are divided into plots of various sizes and for different uses such as residential, industrial, commercial, public and semi public uses. In this regard, members of the public particularly families are required to submit their proposed layout plans to the Area Urban and Regional planning Office for planning approval. Investigations revealed that to date a total of 641 residential layout plans have been processed and approved in Akure by members of the public as against 20 by public and semi public organizations in the town. Approved layout plans are required before planning permissions are granted to developer to commence physical development on land. The process of approval of layout start with submission of proposed subdivision plan. The plan is scrutinized by officers of AURPO to determine conformity of the plan with planning requirements and standards. Where a plan falls short of planning standards it is returned to the promoter for necessary corrections and amendment. When the promoters have complied with all requirements, such layout plans are accepted and recommended by the Area Urban and Regional Planning Officer to the Director of Urban and Regional Planning at the state ministry of Works, Lands and Housing for approval. Field investigations shows that besides the fact that the various approved layout plans are not coordinated, there is no single plans fixing them together. In

addition after approval, there are no evidence of monitoring to ensure that development followed approved plan

Another area in which the planning office functions in the city, is the area known as 'Protest and Petition". In this case, any member of the public that is disturbed by his neighbour is allowed to report to the planning office, where an officer of the ministry is deployed to investigate and report to the office for final settlement.

Besides the above, the Department also carries out development control where the city according to the Area Planning Officer, is divided into six zones and Zonal inspectors are appointed to go round their zones daily to identify and stop contravention. This activity according to the ministry is hampered by inadequate facilities such as motor vehicles and motorcycles. At present the Area Officer does not have vehicle of any kind. Development control is being carried when aggrieved individuals comes forward to report contravention.

Empirical investigations and observations of urban dynamics in Akure indicate that at the moment urban planning has very little influence over the process of land management in the city, changes in land use patterns are the result of a series of ad hoc solutions. For instance Ondo state is one of the 13 beneficiary states in Nigeria under the World Bank Assisted Community Based Urban development project. Thus, two communities: Oke Aro/ Eyinke and Irowo/Odopetu were identified in Akure to benefit from the project. Under the project infrastructure and municipal services such as roads, water supply, and waste management scheme were upgraded and provided in the selected communities, However, this project were carried out outside the formal land use planning and management system, They are carried out by committees under the Governors office.

Constraints to Effective Land Management

Having discussed land use planning and management systems in Akure, it is evident that land use management is ineffective and uncoordinated in the city. A number of factors are responsible for this state of affairs. These constraints are briefly discussed as follows.

Non Adoption and Utilization of Modern Planning Approaches.

Following the leading of the international community, a number of concepts and approaches such as sustainable urban development that emphasized sound environmental management including land management has been devised and adopted. Field investigations show that, these new approaches and methodologies have not been incorporated into land use planning and management in the city. As shown by Aribigbola and Ebehikhalu, (2006), the basis of planning in Akure is the traditional master plan approach that emphasizes the utilization of the professional expertise of planners to determine and articulate physical development plan for the city. Therefore; non-adoption and incorporation of the new approaches are a major constraint that needs to be surmounted to ensure better management of land in the city.

Outdated and Outmoded land use Planning Policies, Laws and Regulations

Land use and management in Nigeria is still based on the land use Act of1978. This law was mainly concerned with use and allocation of land for different purposes The Urban and Regional planning Act of 1992 that was meant to improve planning activity and land management in Nigeria is yet to be implemented. Land use planning and management in Akure and most towns in Nigeria is still based on the 1946 Act which itself was based on the 1932 Town and Country Planning Act in United Kingdom. Thus, one of the

major constraints to effective and efficient land management in Akure is the absence of up to date and dynamic laws and regulation to guide and control land use activity and management. The land use act mainly deals with allocation and acquisition and confirmation of title on owners, it does not indicate the vital aspect of management which is the control of development on the land.

Table 2: Staff of Akure Area Urban and Regional Planning by category
Source: Area Urban and Regional Planning Office, Akure, 2005

S/No	Category of Staff	Number of Staff	Percentage
1	Registered Planner	2	14
2	Sub Professional	2	14
3	Town Planning Assistant	6	43
4	Others	4	29
	Total	14	100

Inadequate Manpower

Closely associated with the above constraints is inadequacy of qualified planning personnel to manage land use in the city. The Akure Area urban planning office is saddled with the responsibility of carrying out the planning and control of development on land in Akure that has an estimated population of over 350,000 and a total area of 30 square kilometers (Ministry of Lands & Housing, 2000). Table 2 shows the total number of staff of the Area Planning Office to be 14. Out of this number, majority (86percent) are non-professionals. Only 14 Percent are registered town planner by Town Planners Registration Council of Nigeria (TOPREC).

Poor and Inadequate Funding

Another major constraint to effective land management is poor and inadequate funding of land use planning activity in Ondo State. A close observation of the State's government budget for current and last financial year shows that no financial allocation was made directly to land use and city planning. This activity did not feature at all directly in the budget proposals for the periods. The only allocation indirectly to land use management covers staff salaries and other emoluments. In such a situation, it becomes difficult to initiate plans and development schemes to organize land use and land management and undertake other essential planning tasks germene to land management. This explains why the last master plan was prepared for the city in 1980. Field investigations also show that in the last 10 years no physical development schemes have been initiated and executed by government and government agencies. As a result of poor funding, essential facilities required to undertake planning activity are not available. Thus, the activity of the Department has been restricted to the approval of layout and building plans prepared by families, communities and individuals as well as granting statutory rights of occupancy to owners of lands.

Inadequate Institutional Framework for land management

As indicated earlier, the Department of Urban and Regional Planning of the State Ministry of works and Housing Undertakes the planning of the city. Other agencies that are involved in planning activity in the city include Capital and Urban Development Authority that was recently merged with the State's Housing Corporation. The Housing Corporation has three housing estates established and controlled by them without reference to the Department of Urban and Regional Planning. The Department of Urban and Regional Planning of Federal Ministry of Housing and Urban Development also controls the physical development activities on federal land and federal government housing estates in the State. Akure South local government has

also been involved in planning in its own area of jurisdiction. These various agencies carry out land use planning and management tasks without proper reference to each other. Investigation reveals lack of coordination of their activities.

Beside, the above, land management in the city operates in a vacuum. Overall land use map for the city is not available or outdated. The existing base map of the city is that prepared in 1968. This has become grossly inadequate to facilitate effective management of the city's land. Other associated problems include lack of adequate and reliable demographic data. Field investigations revealed that land use planning and management in the city is for most part restricted to estate development for public secto worker at the expense of overall management of the city' land.

Policy Implications and Recommendations

Having elaborated on planning process and land management practice in Akure and found that it is ineffective to actualize adequate management of land of the city, it becomes incumbent to identify how to improve land management in the city to make it innovative and responsive to modern trend and approaches.. This is essential because development of most urban areas is influenced, to some extent by processes of urban policy and urban planning; and since urban policies and planning are dynamic activities whose formulation and interpretation is a continuing process, there is a need to invigorate planning machinery and land management activity in Akure to incorporate and integrate all land management agencies in the city and to introduce measures to guarantee effective and efficient land management in the city.

In 1999, the Ondo State government enacted the state's version of the 1992 National Urban and Regional Planning Law. The1992 National planning law assigned responsibilities to all the three tiers of government and created National planning Board at the federal level, Planning Board at state level and Planning Authorities at the local government level. The laws make planning a local government affair, the tier of government that is closer to the people. Unfortunately, several years after their enactments, they are yet to be implemented. This law should be implemented immediately, since they make control of physical planning and development a local affairs, they will definitely improve land management in the city.

At present local people have little involvement in policy formulation and decision-making and their needs and view are rarely considered. Drawing on the experience of other countries, policymakers should develop appropriate mechanisms to involve local people in land use planning and decision-making about the use and management of land and forest resources. Traditional institutions, which have close relationships with local people, should be involved in managing resources and government agencies should work together with those institutions. Moreover, the policy formulation process should be made participatory.

There is the urgent need to review the Land Use Act of 1978. The advent of the Land Use Act and the instrument of Certificate of Occupancy have fuelled unprecedented speculation, private ownership and commercialization of land. The unbridled corruption and high-handedness encouraged by the Act have also defeated the equity and accessibility advantages that the Act had intended to ensure.

As a matter of urgency, government should embark on a comprehensive cadastral of all lands in the country, to determine their quantity and desirability for various purposes, using the Geographical Information System (GIS) approach. Lands should be listed and titled to ensure the security of tenure of the holder. It is only when the quantity and quality of lands are known that lands could be classified for various uses, and other policies applied to them.

A comprehensive coding of lands should facilitate easy referencing, as well as define property boundaries, thus eliminating boundary disputes.

There is the need to strengthen land management capacity in the city. Capacity building with respect to land issues should be distinguished from manpower development. Sustainable land policies should combine incentive systems, which should be negative (i.e. sanctions), or positive (i.e. rewards), in order that land policies are enforced. Enforcement of land policies requires effective policing; otherwise, the objectives will be defeated. Thus land use control mechanism and department should be improved by employing more people making available facilities that will facilitate and enhance their land use control activity

Conclusion

The paper shows that land management and control tools are either not available or weakly implemented. Besides the paper found land use activity to be disjointed and uncoordinated since several organizations and agencies are involved in land use without a coordinating agencies or an overall land use plan within which effective land use management can be undertaken.

The paper concludes that for land use management to be effective, there is the need for an integrated land use approach. The present approach of disjointed and uncoordinated land use practices cannot be expected to provide the desired outcome of sustainable city development. Thus, for land use management to flourish and more importantly to create convenient and conducive environment for present and future generations, there is the need for a more fundamental rethinking of land use control mechanism, policy and action. Land use management in Ondo State should be decentralized and new legislation that would reflect current global thinking and approach to more humane and environmental friendly approach of sustainable development need to be embraced and instituted in the city and country as a whole.

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6.6 Sustaining Green Space Investment

Peter Morgan

ABSTRACT

Despite the growing recognition of the importance of public green space to successful urban regeneration, securing sufficient revenue to manage and maintain such spaces remains a perennial challenge. Without long–term management solutions, these spaces may become part of a new problem in future years.

In the UK, 'traditional' solutions of incorporating sites into local government management frameworks or continuing to seek grant funding are increasingly untenable. Local government budgets are stretched as statutory responsibilities increase, and the future availability of other major sources of funding such European structural funds and the National Lottery is uncertain. Seeking disparate and short-term sources of funding is inefficient, consuming disproportionate amounts of costly effort.

Alternative models need to be developed, based on three fundamental prerequisites: generating revenue, engaging communities and working with nature. New thinking is required to provide reliable and permanent solutions and to influence future public policy and investment decisions.

Introduction

Programmes of urban renewal and brownfield regeneration frequently result in the creation of new or improved public green space. Indeed, there is a growing recognition of the importance of green space for successful regeneration and the lasting economic, social, cultural and environmental benefits it offers.

Poor design and maintenance of green spaces played a major part in some of the twentieth century failures in housing and urban planning. Links have now been demonstrated between high-quality networks of green spaces and increased house prices; their benefits in improving the image of an area and attracting investment; their contribution to biodiversity; their contribution to promoting exercise and associated benefits to health; and the role of public space design and management in tackling social issues such as public safety and anti-social behaviour. CABE Space (2005)

In the latter part of the twentieth century, the UK experienced a decline in green space management with chronic under investment in green space maintenance budgets. Department for Transport, Local Government and the Regions (2001). In 2001, an assessment of nearly 3000 urban parks found that only 18% could be described as being in 'good condition' with 39% of local authorities reporting the quality of their parks as 'poor' or 'declining'. Urban Parks Forum (2001).

The government responded by setting up an Urban Green Spaces Task Force, and subsequently a separate unit within the Commission for Architecture and the Built Environment, CABE Space, to champion urban space issues. There has since been an increasing focus on the quality, accessibility and design of urban green space,

with significant government investment. However, the sustainability of this investment remains open to question as it has been directed almost exclusively on capital improvements to green space amenities. Questions over the long-term management and maintenance of the resulting green infrastructure have been frequently overlooked and securing sufficient revenue remains a perennial challenge.

In the majority of cases, green space management and maintenance issues have been dealt with through a combination of three 'traditional' models:

- incorporation within local authority maintenance or management frameworks
- ongoing search for grant funding as a means of ensuring revenue investment
- design and delivery of projects that encourage and enable local community members to share some of the maintenance or management responsibilities.

It is becoming increasingly clear that these 'traditional' responses are no longer sufficient on their own and that new thinking is required to identify and develop alternative models and mechanisms which provide more reliable or more permanent solutions.

It is now increasingly accepted that there are three fundamental prerequisites for ensuring the sustainability of green spaces: **generating revenue, engaging communities and working with nature**. This paper presents a brief overview of the challenges and issues being faced in each of these three areas, and looks at how this debate can influence future public policy and investment decisions.

Generating revenue

Funding the long-term and ongoing management and development of green spaces is more problematic than funding initial capital works for two obvious reasons:

- capital funding is generally more politically attractive as it often involves a clear and rapid transformation for which credit can be taken
- a commitment to long-term revenue funding limits future options for those in control of budgets.

Revenue funding for most green space projects is generally sought from a combination of four main sources: local authority budgets, grant funding, financial assets or endowments and income generation strategies.

Local authority budgets

Local authorities in the UK have an involvement or stake in a huge range of green space projects, in many cases being the landowner. Inclusion of a site within local authority maintenance plans and revenue budgets has historically represented one of the most secure means of assuring ongoing maintenance. However, local authorities have many funding needs to balance and there is an ever-present risk that funding for green space may be withdrawn or cut.

In recent decades local authorities have gradually taken on responsibility for additional areas of open space, often created through regeneration projects. This has further stretched revenue budgets, frequently leading to an overall reduction in maintenance standards. A key factor is that the maintenance of green space is not a statutory duty for local authorities. So although money provided by central government for environmental services has risen substantially in more recent years, this has largely been channeled into activities that local authorities are legally required to undertake, such as waste management and planning controls.

The UK national government's ongoing programme of local government modernisation has also led to changes in the way that the management and maintenance

of green space is delivered. A wide range of contracting and partnering arrangements have been introduced, often with specialist private sector companies but in some cases with voluntary sector bodies. Although this can bring significant benefits in terms of value for money it can also present challenges due to a loss of expertise and local knowledge from local authorities' work forces and issues around contractual continuity.

These new arrangements also risk weakening the link between the day-to-day maintenance of green spaces and strategic planning decisions, which in turn jeopardizes long-term thinking and investment. Although more local authorities are developing integrated green spaces strategies there are still examples of fragmentation with responsibility for maintenance functions sitting across different departments. This reduces the ability of local authorities to achieve the added value and efficiencies that can be gained by adopting strategic management plans for whole green space networks.

Recent policy developments have, however, opened up significant new avenues for generating additional resource for green space management, particularly through links with the private sector.

Planning agreements

Some local authorities use planning agreements to fund the upkeep of green spaces through an annuity or 'commuted payment' levied on new development. In particular, Section 106 of the 1990 Town and Country Planning Act allows a local authority to enter a legally binding agreement with a developer over related land. Funds can be invested and the interest used to support ongoing revenue funding of spaces within the development, although interest rates may be too low to produce sufficient amounts. Funds could also be diverted to support maintenance in other areas or used as match-funding for grant applications.

Business incentives

Recent UK government initiatives have encouraged local authorities and businesses to work together to improve the physical environment in which businesses operate. Local authorities can retain a proportion of the increase from business rates specifically for this purpose. Business Improvement Districts (BIDS) are another mechanism that can be used by local authorities to encourage businesses that want to improve their trading environment to agree to pay for additional services, including green space management.

Grant funding

Grant funding still remains one of the primary sources of generating additional income for green space management and development. The last few years have seen significant additional sources of public sector grant funding made available by central government and the National Lottery specifically for green spaces. The issue of long-term revenue funding is also beginning to be recognised as a legitimate use for such grant funding. For example some National Lottery funds have allowed bidders to build in revenue funding equivalent to 10% of the total capital costs, but clearly, this remains a very small overall proportion.

However, this new investment should be seen within the context of a wider funding landscape. For many years public and voluntary sector bodies have been successful at utilizing mainstream funding aimed at promoting regeneration and competitiveness for enhancing and developing local environments. The primary sources of this funding have been the UK's Single Regeneration Budget (SRB) and European structural funds. From this year, SRB will no longer be available and the level of structural funds invested in the UK will have significantly diminished.

It is likely that new sources of regeneration spending in the UK will continue to be channeled through regional development

agencies (RDAs) for whom investment in green space management is not a key priority. The 'green space sector' will therefore need to redouble its efforts to demonstrate the link between high quality environments and regional competitiveness if new grant funding is to be secured.

Although there is now a wider understanding of the importance of revenue investment amongst funders, securing the necessary income via grants is likely to remain a short term and unreliable option which consumes a disproportionate amount of officer time and effort. Struggling to retain and manage a disparate portfolio of grants is an inefficient solution, especially as most of them will ultimately have derived from the same Treasury purse.

Endowments

Generating long-term income for parks and green spaces through the investment and management of cash or other assets offers clear opportunities for sustainability. However, acquiring assets of sufficient value presents major challenges, hence management strategies built solely around endowments are rare.

The most successful examples are those where endowments are negotiated as part of land acquisition arrangements. The motivations of a landowner for disposing of a site, and their wealth, will affect the level of endowment that might be negotiated. The landowner's interest may include compliance with conditions of planning consent, strengthening their negotiating position as part of wider development aspirations, evidencing their corporate social responsibility credentials or enhancing the overall value of a new development through being able to guarantee that local green space will be properly cared for in future years.

The Land Restoration Trust (LRT) is an organization based largely on an endowment model and was created in 2004 to hold and manage public open space arising from land restoration or regeneration, along with associated endowments. A partnership of founding organizations established the LRT in the belief that this approach to long term stewardship had much to offer in terms of returning large areas of derelict, post industrial sites to beneficial community use. It could have a key role in ensuring that both existing and newly created open spaces delivering maximum public benefit. Although still in its early years, evidence to date demonstrates that both private and public sector organizations are prepared to engage and negotiate. The LRT has a target of 10,000 hectares of land under endowment funded management by 2014. Some of the sites currently under negotiation, including the former Liverpool Garden Festival site, have been restored in the past only to fall into a state of neglect and dereliction once again through lack of revenue funding. Although establishing endowments may be initially appear expensive, it is more cost effective in the long term and is clearly a better funding model than having to repeat restoration over and over.

Aside from cash, there are also examples of other revenue-generating assets such as property being endowed for the purposes of funding long-term maintenance. The Milton Keynes Park Trust, for example, manages 4,500 acres of the city's green spaces, funded through an endowment of commercial property assets which are owned freehold by the Trust and which was assembled as part of the establishment strategy for the Trust.

One of the most significant challenges in calculating an appropriate level of endowment for generating long-term revenue is ensuring that all necessary long-term costs are taken into account. These must include both routine site maintenance and management costs and those for longer-term capital works. The size of the fund and the rate of return on its investment (above inflation) must obviously provide sufficient revenue to meet all the identified costs.

Endowment calculations will be affected by the long-term consequences of different site design options. The likely level of endowment available should therefore influence the site design process. Endowments are more likely to be a workable option for networks of sites where some economies of scale can be achieved. However, this demands clear co-operation between those involved in strategy and site design and those responsible for site maintenance, cooperation that is frequently lacking.

There are obvious challenges surrounding the use of endowments as long-term funding vehicles. In general, very large sums of money are needed to generate relatively small amounts for ongoing maintenance. This means that tough decisions have to be made about the level of maintenance (e.g. staffing or capital replacement) that the fund can support.

Income generation

Another means of contributing to the long-term economic sustainability of a site is to create ways in which it can generate or earn income. This might be achieved through:

- payment for access or for use of facilities. These might include sports facilities, a visitor centre, car parking, a café or shop, or renting building space;
- licensing activities such as sales franchises, angling, horse riding or motorcycling;
- not for profit enterprise, for example selling timber products, biomass, or plants and seeds, or providing training.

If income generation is to be part of the management mix for green spaces then this needs to be considered during the planning and development phase with the site and any associated assets managed as a whole. Opportunities to earn income are often lost because assets are stripped away for separate development, rather than being maintained with the green space. This solution is also more likely to be effective for new facilities or green spaces which are subject to substantial regeneration since it is generally more difficult to introduce revenue-generating facilities into spaces that are already established due to design constraints and established patterns of use.

Another challenge when considering these commercial options is the need to factor-in the cost of additional project requirements such as business management skills along with associated staffing and training needs. A robust business plan must be able to demonstrate that these activities will indeed be profitable.

Factors that may limit the level of income that is achievable include:

- the level of affluence of the community within which a site is located.
- site ownership. Without direct ownership, the ability to 'ring fence' earned income for project management and development costs may be restricted. For example, where sites are in public sector ownership, earned income may have to be returned to the local authority. It is therefore important that appropriate financial arrangements are agreed and put in place at the outset.
- low commercial or market value of the 'asset' (which may possibly even be negative if all risk and liability considerations are taken into account). In this case the scope for creating adequate revenue streams from such facilities would be significantly limited.

Despite these challenges there are clear messages emanating from the UK government that generating income and revenue from assets is seen as an increasingly important part of future approaches to regeneration and the management of important neighbourhood-based services.

Recent legislation should help in this regard. Since 2003 councils in England have had the power to dispose of assets including derelict land and disused property to community groups at a discount of up to £2 million including the handover of significant assets for nominal fees of £1. At the same time there is increasing pressure from central government for councils to make better use of unused or derelict land in its ownership, a stock which has been valued at £10 billion.

Community engagement

Involving users and those who live near green spaces in the process of planning, design, delivery and management is now widely accepted as a fundamental part of promoting long-term sustainability. Active involvement of local residents in decision-making processes and project implementation brings considerable benefits for site management, for the individuals involved (e.g. through the development of new skills and training opportunities) and also for wider community development.

The contribution made by local community groups to green space management in the UK is substantial. There are over 4,000 community groups involved in green space projects and it is estimated that the annual economic value of their work could be as much as £35 million. GreenSpace, (2003).

Real community engagement, especially through the involvement of young people, increases the level of self-policing and can reduce levels of vandalism and anti-social behaviour on site. Involvement in public space development projects can also nurture more widespread active citizenship, contributing towards stronger, more participative local democracies. A study by the Centre for Local Economic Strategies highlighted the power of participation in green space projects to deliver higher levels of formal volunteering, community representation, devolved decision-making and power sharing. CLES, 2005.

Types of involvement

There are several ways in which local people can be involved in the management and maintenance of a site, ranging from the informal contribution of volunteers and site users to formally constituted groups that are directly responsible for the stewardship of a site, and to those that have taken on legal tenure of the land. Examples include:

- **Site management through local authority support of local groups and volunteers.** This may involve provision of a budget and the delegation of some management responsibility.

- **User groups**. Groups that use sites on an informal but regular basis, e.g., anglers, birdwatchers, horse riders or motorcyclists, who may wish to become involved in site management to ensure the provision of their facilities.

- **Friends groups**. Formally constituted groups which have responsibility for the day-to-day management of green spaces and their future development. Having legal status may enable it to hold the lease for a site (or even take on legal ownership), control budgets and apply for future funding.

- **Community Land Trusts (CLTs).** A not-for-profit organisation owning or leasing land and property in trust for the community. Land Trusts are popular in the USA where there are now around 1,000 such examples protecting more than six million acres of open space, to which the US federal government provides financial assistance for legal and other technical expertise.

Understanding ownership

An important aspect of safeguarding the long-term future of a site is the degree of control a community group can exert

over its management. The phrase 'community ownership' is in widespread use in the regeneration sector but has many interpretations from a strict legal definition to a more philosophical statement of who feels attachment to an area.

Full ownership confers the highest level of control, providing security of tenure, enabling long term planning and decision making and overcoming the need to defer key decisions to another party. But full ownership is not always achievable or indeed desirable. There may also be an advantage for the community group in leaving any possible liabilities in the hands of a corporate or public sector landowner. If full ownership is not possible there are other mechanisms that can be used such as long lease arrangements or other formal agreements. The different levels of responsibilities and associated liabilities of each type of arrangement should always be weighed against the regeneration benefits.

One aspect of 'ownership' that is coming under increasing scrutiny in the UK is legislation surrounding 'rights of common'. Some have argued that revisiting and reinterpreting this ancient legislation with a view to making it more widely applicable to green spaces, particularly those in urban areas, may bring with it substantial benefits.

Sustaining involvement

While structures such as Friends groups can be seen as one of the most effective ways of involving communities in the management of a site, it is important to remember that these groups will often need ongoing support if they are themselves to be sustained and allowed to develop.

In particular, groups may need practical help to establish and organise themselves and then to work with local authorities or other public agencies. This will involve training and capacity issues as volunteers involved in green space management tasks require a diverse portfolio of skills from practical conservation tasks to meeting and negotiation skills, assertiveness training and publicity and fundraising skills.

Evidence shows that many community groups come into existence for a particular reason – coalescing around a very specific set of issues - and then often disband or simply run out of energy when those immediate issues have been addressed. Also, membership of groups will fluctuate over time as residents come and go. Young people in particular soon grow up and each new generation of youth needs to be engaged.

Continuous modest improvement helps to sustain community interest as setting goals and timetables for work provide positive outcomes which keep people motivated. Maintaining a number and variety of events and promoting school use of a green space can also generate ongoing involvement. Mentoring is a useful way of developing a formal supportive relationship between local people and professional agencies over the long term. Networking with other community groups can provide opportunities to exchange ideas and information and discuss problems.

Working with nature

More and more green space practitioners are coming to recognise that working with the grain of nature, or adopting an ecological approach to green space planning and management, not only benefits wildlife and ecosystems but is often popular with local residents and can provide a cost-effective long-term management solution.

Sites managed for their wildlife and biodiversity value can be much cheaper to maintain than large areas of grass and are often seen as more attractive. Traditional gang mowing, for example, is often more expensive than caring for wild flower meadows or woodland. This approach can be particularly effective when dealing with large numbers of fragmented sites in

low demand areas, or when reclaiming derelict, contaminated or potentially dangerous sites to create new green amenities. NUFU, 1998.

Through this approach, individual green spaces are treated as unique places which enhance local distinctiveness and contribute to the wider (regional or sub-regional) landscape and ecology. This involves looking at the existing character of the site in terms of its topography, soil and geology, hydrology, climate, flora and fauna, as well as man-made or cultural features and current uses by the local community. It may also involve conducting historical surveys and identifying former uses - exploring processes that have led from past to present and which may give shape to the site's future.

Using this information it is possible to predict the natural trajectories of development among the plant and animal communities e.g. to understand what will happen if there is no human influence. Different scenarios for the site can then be explored, and the costs (levels of intervention and management) and benefits (ecological, social, economic, cultural and aesthetic functions) of the various options identified.

Some of the key issues in implementing this approach involve timing and managing the expectations of both funders and communities.

Managing timescales

The long-term nature of this approach requires planning in ecological and generational timescales alongside usual shorter time frames driven by funding timetables and reporting deadlines. There is a need for funders to be sufficiently flexible to allow the necessary time and resources to be allocated to the preparatory stages of the project in order to conduct the required site surveys and community consultations, before any capital works can begin.

Physical changes to sites will be seen as slower and less 'dramatic', often making political or funding support more difficult to achieve. With this kind of approach the ideal scenario is to extend funding arrangements over the actual 'natural' development period of the project, allowing money to be spent beyond the initial capital phase over whatever time period is appropriate. However, it has to be recognised that maintaining a long term vision, with incremental investment stretched over many decades, is not easy. Having a well researched, accurately costed and actively managed site plan is key to achieving this.

Managing community expectations

Communicating biodiversity value and offering alternatives to traditional aesthetic views is a challenge for many of those involved in developing or managing green spaces in an ecologically-informed way. Residents may 'like what they know and know what they like', preferring a more manicured park style, and may not be used to the rougher look of more natural spaces or aware of the full range of benefits these can provide for the local environment and community. Residents more familiar with the 'weekend makeover' approach to landscape that is portrayed in the popular media need to be engaged, ideally by incorporating short term milestones within the much longer term overall management plan.

Community expectations and wishes then have to be balanced with the views of those conducting ecological surveys as both need to inform the design process and site management plans. It is important to note that whilst the ecological approach generally requires lower levels of intervention, maintaining a biodiverse or ecologically functional green space does not necessarily mean the least levels of intervention. The most interesting or significant ecological features may need special maintenance, and would disappear if nature were left to its own devices (e.g. heathland reverting to woodland).

Although balancing these various sets

of expectations may be challenging, this can also present opportunities. Thorough community consultations will help generate local support and sustain interest and involvement, which are essential for the long-term management of this type of project. As described above, local involvement in green space management can also lead to benefits for individuals in terms of education, training and skills development, and to wider community benefits by contributing to capacity building, increasing social capital and promoting understanding and action on sustainable development.

Conclusions

The importance of green space infrastructure is now widely accepted. Across Europe, huge amounts of money are being invested in creating and improving green spaces. Parks, play areas and other open spaces have come to be recognised as a vital component in delivering neighbourhood regeneration, improving liveability, promoting health and well-being and creating thriving, sustainable towns and cities.

Having rediscovered the importance of green spaces to society, the recent priority in the UK has been to invest in creating new, high quality green infrastructure and in undertaking remedial works to those sites that have suffered deterioration or are not realising their full potential. The debate now needs to move on to how this capital investment is to be protected in the long term.

It is clear that no single model will provide an effective management solution for the huge variety of green space facilities and amenities and that we need to fashion new arrangements that bind together public accountability and leadership, private income and community interests. There are a growing number of examples where new arrangements are being tested and applied, both in the UK and further afield. It is important that we capture and share the learning from these examples and identify the scope for replication elsewhere.

The following recommendations are offered as a means of ensuring the debate about the long-term management of the public realm are put at the heart of policies for regeneration and sustainable development in both the UK and across Europe.

Recommendations

The following recommendations are drawn from the above and from recent work on this subject carried out, in partnership, by CABE Space and Groundwork.

Adopt a regional approach

Individual green spaces need to be considered in the context of a wider 'green infrastructure'. Regional spatial strategies provide the opportunity to achieve efficiencies of scale and enable the management of green infrastructure to be built into housing and economic development strategies.

Build revenue into management frameworks

Ongoing revenue is essential to all models of long-term management. Local governments, in particular, need to consider this as part of mainstream budget-setting exercises. There is scope for more creative thinking about generating income from specific sites and associated assets. A growing number of asset-based approaches have been developed such as deriving income from endowed assets or establishing social enterprises whose work and financial surpluses serve to maintain the green space. It is therefore essential to ensure that potential assets are not 'stripped off' but maintained with the green space as part of a long-term plan.

Fill the knowledge gaps

There are significant 'evidence gaps' about the costs and value of green infra-

structure. There is a lack of key management data that would help with long-term strategy, planning and resourcing. There is a particular need to devise new ways of measuring the asset value of green space and of selling the wide-ranging benefits of well-managed green infrastructure to those who have responsibility for securing the associated outcomes.

Raise the public profile

Changing the attitudes, perceptions and priorities of decision-makers and the public at large is the only way of achieving significant long term revenue funding for green infrastructure.

A huge amount has been achieved in terms of investment in the creation and restoration of urban green spaces. Without long-term management solutions these spaces may become part of a new problem in future years. It is hoped that these recommendations will help to ensure that this investment will have a lasting impact.

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6.8 Cases of revitalization of urban areas as examples of integrated urban land management

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ABSTRACT

Urban areas which have been degraded by industry constitute currently a significant problem related to local economy and spatial development. From the local authorities` perspective, revitalization of post-industrial sites is a difficult and tough duty.

Taking into account the sustainable development principles, the post-industrial restructuring process in a scale of municipality becomes a multi-aspects, multi-year undertaking of strategic character. It concerns both revitalization of a district in town and of the area of the whole town. The paper presents experience connected with both cases. One of them is elaboration process of Revitalization Program addressed to the industrial quarter in Cracow city (Zablocie case study) the other concerns the town of Cz□stochowa, where areas for revitalization were defined and Revitalization Program in the scale of municipality was worked out.

Introduction

The main objective of revitalization of urban areas is restoration of their abilities for independent functioning in an urban structure. In order to provide a comprehensive approach to revitalization within a whole area of a municipality revitalization programs are formulated. The main purpose of such program is to define principles and a scope of an intervention of municipality towards stimulation of processes and activation of the potential of individual districts.

Integrated urban land management should be provided by following rules:

- Integration of objectives in the individual aspects i.e. spatial, social and economic with following at the same time of premises of the local land use plan.
- Co-ordination of activities in time and space.
- Concentration of means and activities – setting priorities, their hierarchy and formulation of schedules.
- Flexibility.
- Balancing of costs and effects,
- Stimulation and enhancement of internal forces directed towards revitalization of a district.

Strategic character of Revitalization Program

The main purpose of Revitalization Program of post-industrial and urban areas is creation of a proper structure for development of local economy respecting interests of different stakeholders as well as preserving cultural heritage landmarks.

Revitalization Program should be compatible with the main strategic documents concerning municipality level and regional level, first of all development strategy and land use plan. Especially development objectives should be taken into the analysis and new functions of the areas designated by the land use plan.

Construction of the Revitalization Program is following methodology of elaboration of strategic documents and consists of the following stages:

- Diagnosis
- SWOT Analysis,
- Defining objectives,
- Formulation of tasks (projects),
- Implementation system,
- Monitoring.

This classic approach was applied in two cases:

1. Zablocie – industrial quarter of Cracow city
2. Post-industrial and degraded urban areas of municipality of Czestochowa.

Case of Zablocie – district of Cracow city

In the case of Zabłocie – district of Cracow city analysis of the following problem groups was performed in order to formulate revitalization program:

- Entrepreneurship – including development of new enterprises, establishing new contacts, co-operation and exchange (exhibitions, fairs etc.); concentration of capital (joining enterprises), change of sector structure (development of enterprises of service character), change of production structure (elimination of polluting, space and energy consuming industry),
- Land management – including creation and management of public space, modernization of infrastructure, optimization of traffic routes (for cars, bicycles and pedestrians),
- Science and culture (enhancement of development of high education),
- Society,
- Housing (better quality of existing houses, providing conditions for development of constructing one-family houses and of developers' activities),
- Safety and life quality.

Areas of interventions taken into account while formulating revitalization program of the district were following:

- social sphere,
- sphere of economic activity,
- sphere of revitalization of areas of landscape and natural values.

Stakeholders involvement was one of the most important parts of the process of elaborating Revitalization Program. To this end two workshops for stakeholders were organized to give them an opportunity to take part in formulation of activities, which would be most desired and effective in achieving program objectives.

Activities were defined in each of three spheres. The flag project was also proposed concerning restructuring of the main street in the area – Lipowa Street. Along the street specific objects are located such as Schindler's Factory, local railway station, the street is connecting housing area with post-industrial part of the district. After the project completion the street will become a main communication route inside the area but also connecting the quarter with the neighbouring districts leading to the very middle of the Old Town of Cracow.

Among the projects some very modern

and innovative solutions were proposed, such as places for extreme sports, adaptation of post-industrial objects for lofts etc.

The Program was elaborated with a close co-operation with the City authorities – the Mayor and Revitalization Board, who submitted the final document to the City Board for acceptance.

Figure 1: Typical view of the landscape in the post-industrial area of Zablocie in Cracow

Figure 2: Central Market Place in Cracow

Case of Czestochowa – Municipal Revitalization Program

In the another case of revitalization of post-industrial and urban areas of Czestochowa (world famous for the Sanctuary of the Black Madonna) sites for revitalization were defined basing on a number of criteria, such as: typical post-industrial area (after liquidation of large industrial objects such as steel mill), district with visible signs of critical social phenomena (e.g. unemployment, social exclusion), area connected especially with pilgrims traffic Gasidło, Gorgon (1999). Every year several million pilgrims–commoners as well as celebrities–come here to pray before the miraculous picture of Our Lady of Czestochowa, placed in Jasna Gora monastery.

Seven areas were defined for revitalization: two urban degraded areas and five post-industrial ones.

The following groups of actions were taken (presented in a hierarchy set by stakeholders):

1. Revalorization and development of the system of parks and recreation areas
2. Enhancement of economic structure in urban areas under revitalization
3. Revalorization of monuments
4. Restoration of areas and post-industrial objects
5. Regeneration of public space
6. Improvement of safety
7. Improvement of traffic safety
8. Supporting activities of local communities
9. Better cultural and entertainment offer
10. Planning instruments
11. Modernization of old urban tissue
12. Modernization of technical infrastructure
13. Prophylaxis and promotion of healthy life.

Involvement of stakeholders in the task of formulation of the final version of Revitalization Program was the most important and difficult exercise. Starting from getting public opinion on the situation in town (in social, economic and spatial/environmental aspects), through analysis and prioritization of areas and actions up to final discussion on some particular projects – all these steps needed hard organizational work.

Methods used in realisation of these tasks included:

- inquiry for opinion of the present situation in town,
- comparing pairs for prioritisation of areas (question: which of these two areas will better contribute while revitalised to reaching the strategic development objective of the town from the view-point of 1. economic/social development, 2. tourist function development?),
- prioritization of groups of actions by allocation of scores.

Conclusions

Revitalization of degraded urban and post-industrial areas in the context of sustainable development requirements needs integrated approach. Therefore in the scale of municipality a document of revitalization program should be elaborated. Practical examples show that revitalization programs constitute documents of strategic character, they are very close to development strategy programs, except they are more detailed and concern selected areas of the town. The most important element of these programs in the process of their elaboration is involvement of stakeholders. Afterwards during implementation management system should be provided with detailed financial and monitoring scheme. In both cases a special body within City Council was assigned the duty of Revitalization Program management.

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Figure 3: Polluted Warta river in Czestochowa

Figure 4: Post-industrial premises of textile manufacture in Czestochowa

7

International Brownfield Activities

7.1 Urban Operation "DIAGONAL SUL" - a São Paulo contemporaneous City Project

Manuelito Pereira Magalhães Junior, Pedro Manuel Rivaben de Sales

ABSTRACT

In light of the several challenges faced by the city of São Paulo in the 21st century, one of the new issues that is becoming more evident is the urban revitalization of old industrial and railway areas which became obsolete due to technological and commercial restructuring of the production basis. What are the public policies and urban tools available to face this issue? How does the new Strategic Master Plan deal with it? What are the resulting alternatives and hypothesis? What technical programs and institutional configurations may be designed having in mind the specificity of the potentialities and frailties observed in these areas: potentially contaminated soil, environmental quality to be recreated, urban patrimony to be preserved, modernization of railway transportation, population density in downtown areas, and rearticulation of the production basis? This paper is aimed at discussing this issue, analysing the Diagonal Sul Urban operation project and the related technical issues involved.

Introduction

With its 11 million inhabitants and a major financial, economic, cultural, academic and technological centre in Brazil, the metropolis of São Paulo steps into the 21st century with a picture of debts and doubts which challenge its own future.

In on one hand, if the vertiginous population growth which has marked its history and landscape in the past century gives signs of a marked decrease (with the annual population growth rate going from 5% in the 70's to 0.8% from 1991-2004 [SEADE, 2004]), the industrial production basis, which was installed and has progressively modernised since the 30's seems to be migrating to other regions (especially to the area known as the macro-metropolis, a territory of 150km whose centre is the city itself) leaving undefined the design of new production and institutional configurations which are going to replace the hegemony of that basis.

On the other hand, this dynamics is followed by the worsening, or at best, the unfair maintenance of social and urban conditions (unemployment, public transportation, housing, social-territorial exclusion, environmental issues). The territorial picture paradoxically opposes a central area (which loses its population, but concentrates jobs and the highest construction and infra-structure densities) to the suburbs (which have an increase, of more than 5% per year, of the low and very low income population, scattered through an area which is not prepared for occupation, often because they include some of the major natural reserves of the city)

Because of this reality and its intrinsic challenges, São Paulo's Strategic Master Plan [SÃO PAULO, SEMPLA, 2002], and the Sectorial Strategic Plans [SÃO PAULO, SEMPLA, 2004], were approved in 2002,

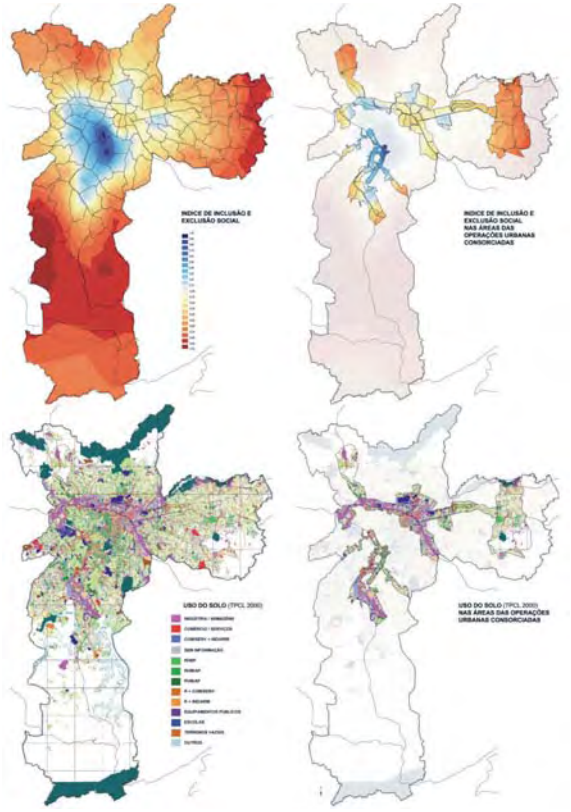

Figure 1: City of São Paulo; indicators of social exclusion, economic activities in the context of urban operations.

in the framework of the "Estatuto da Cidade", the City's Bylaws [BRASIL 2001]. Amongst the major measures foreseen in these documents, are those which try to cope with the social problems related to housing (defined as Special Zones of Social Interest), environmental issues (macro zoning of protected areas and linear parks along the river beds), the financing of the city's management (by means of "outorga onerosa" [an urban planning instrument which allows the private initiative to buy the right to construct above the indices foreseen in the zoning legislation] and the transfer of the right to construct and of consortiated urban operations).

The latter is the one we are going to discuss in this manuscript, i.e. consortiated urban operations. They are urban policy instruments to be established by a specific law, through which urban, social and environmental improvements are carried out in a specific area, counting on resources obtained from "outorga onerosa" as mentioned above. In this case, therefore, the market participates actively, although only partially, in the payment of the expenses in urban infrastructure.

As foreseen the in the Strategic Master Plan, the expansion of public and green areas, the organization of public transportation, the implementation of social interest housing programs and the improvement of the infrastructure and the road and environmental system will develop the basis for new operations, whose objective will be the promotion, appreciation and democratization of the fixed social capital, articulating its territorialities: housing, transportation, production, centrality and green areas. As opposed to former urban operations in the city, the design of the new ones subjects the market interests of the private sector to the social-economic, environmental and economic objectives of the public sector with a larger scope and transformation and redistributing potential.

Urban Operation "Diagonal Sul"

The so-called Diagonal Sul, is an area of 2000 hectares spread along the Tamanduatehy valley, in the city of São Paulo, which is described by the Strategic Master Plan of 2002 as an area for future consortiated urban operation, including the railway or industrial sectors in the Pari, Brás, Mooca, Ipiranga and Vila Prudente neighbourhoods.

Because of its location in the metropolitan

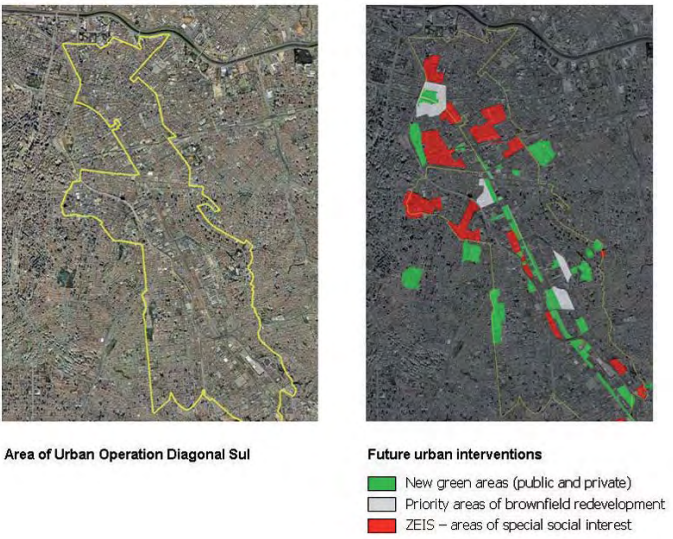

Figure 2: Urban operation Diagonal Sul, area of interest and urban interventions

area (the river-railway axis) and the nature of the original occupation (the industry), the singularity of this region involves the socio-territorial aspect, as well as the productive-economic aspect of the metropolis, its conformation and the changes that affect it. In this regard, the transition from downtown to peripheral areas (related to the socio-territorial aspect) and the transition from industrial to tertiary occupation (related to the productive-economic aspect), indicate the reasons, the rationale and possibilities which shall be the basis for the plans and projects of this urban operation [SALES, 2005].

The studies and projects required for the technical development of the Diagonal Sul urban operation are included among the different activities planned and funded by the Downtown Rehabilitation Program (Programa de Reabilitação da Área Central) of the municipality of São Paulo, counting on financial funding of the Inter American Development Bank – BID.

It foresees the articulation of the whole area (north-south-east) of the metropolitan river-railway axis as an alternative capable of reverting, even if partially, the contradictory picture which opposes a downtown, undergoing a progressive emptying process as a housing area, and a peripheral region whose "dormitory city" growth advances over nonnegotiable environmental reserves.

The funding and conduction of the following studies have been approved:

1. Study for the improvement of Tamanduatehy's water quality,
2. Geo-referencing of socio-economic data of São Paulo (Pesquisa da Atividade Econômica – PAEP, 1996/2001)
3. Inventory of cultural assets: Mooca, Ipiranga, Vila Prudente,
4. Mapping and inventory of areas with suspicion or potential of soil contamination ,
5. Real estate inventory and analysis,
6. Planning of highway infra-structure and transportation in the Diagonal Sul area,
7. Reference Plan for Urban Intervention and Ordinance – PRIOU,
8. Preliminary Environmental Impact Study – EIA,
9. Elaboration of a draft for the Diagonal Sul urban operation law project.

Figure 3: Diagonal Sul; former industrial site (front) and processes of urban growth (back)

Guidelines and Hypothesis of the project

The major issues the Diagonal Sul urban operation and conversion project has to consider are:

- **Infrastructure**: the role of the railway in the structuring of the metropolitan area must take into consideration the modernization of services and the future of the passenger-freight modality at a regional level and its implications at a local level,
- **Production activities**: the nature and logical framework of the new operational and localizational demands of production activities in the metropolitan region in general and in the southeast area in particular, having in mind that the observed trend towards the exodus of industrial plants cannot be indiscriminately generalized, but rather, it should be analyzed based on the renovation of the technological and entrepreneurial structure,
- **Urban structure**: the development of a new urban structure and new land occupation design, considering the transposition and/or elimination of infra-structural and land tenure barriers, combined to the preservation of assets (material - railway/ industry and human - worker/immigrant),
- **Environmental re-qualification**: the different nature of the problems — contaminated soil, drainage, sanitation and water quality, along with the environmental requalification demands – green areas and free areas— required for the reutilization of the areas and population re-settlement in this region.

Therefore, to set up the minimal conditions to deal with these issues, these areas and their dynamics and translate them into an active program, sectorial proposals and their corresponding operational procedures have to be established: organization of the new constructive potential, direct public intervention and induction to the urban reutilization of private areas. As a conceptual and operational strategy for the development of the project, the issue is to develop, overlap and discuss independent technical-thematic layers. These layers include:

- **Transportation means**: increase internal and external urban connection, by complementing, linking and integrating the road and railway systems,
- **Station-poles**: development of new railway station poles (with differentiated socio-economic urban activities and realisation of metropolitan events,
- **Mosaic of green areas and reference areas**: construction of a linear parks, reactivating and appreciating the constructed urban patrimony as an essential development criteria,
- **Residential densification areas**: high concentrated densities with collective green areas,
- **Social interest re-urbanisation areas**: especially inside the Special Zones of Social Interest – ZEIS, defined by the Strategic Master Plan,

- **Industrial areas** undergoing a restructuring process, as defined by the Strategic Master Plan.

The modernization of railway transportation in Diagonal Sul's urban project is a factor for territorial revalorisation and the industrial patrimony to be preserved is a differential resource. Social issues (housing, community facilities) and environmental issues (soil contamination, lack of green areas, heat islets) are the major shortcomings to be faced.

In more specific terms, these objectives foresee the implementation of a road system which goes along the railway and is linked to the beltway which will be built around the downtown area. Another priority is the creation of transversal roads to complement the links of the local road system and favour the integration of the railway, subway, buses and the express line (VLP). This will define the areas where the new poles will be implemented, to concentrate activities with different purposes.

Figure 5:
Diagonal Sul; underused railway sites

The implementation of empty and green areas will be associated to the reoccupation of the railway lots, to the reorganization of land tenure matrices and industrial buildings and consequently, to contaminated soil reutilization and redevelopment programs. In terms of housing, the objective will be the recovery and valorisation of the traditional housing forms and places, in addition to the promotion and diversification of residential densification As to the additional construction potential, it will be distributed according to typological standards and specific use categories to be defined for each one of the sectors of the operation area. The conduction of different studies using resources obtained from the Downtown Rehabilitation Program — PMSP/BID, will support the elaboration of a Reference Plan for Urban Intervention and Ordinance – PRIOU – of this new operation.

Conclusions

The image of a consortiated urban operation instrument is at least paradoxical. In one hand, although included among the social achievements and corresponding urban measures established by the City Bylaws, the urban operation might be a potential trap from the tax collection point of view, within a tax-related logic and/or speculative logic of urban management [BRASIL, 2004]. On the other hand, its recovery potential and distribution of the surplus value generated by the public investment itself, regulating valorization distortions generated by the very same investment, is underestimated because it involves spatial scales that go beyond the urban project, which would decrease the power to obtain compliance, to perform and transform of the urban operation.

The underlying idea of this paper is that the territories which the contemporaneous city involves, foreseeing the transformation of extensive industrial downtown areas, railways, etc, require new concepts

Figure 5: Sub district of Mooca, orientations for intervention (Metro Station, green areas and transport)

and new instruments that might be capable of dealing with the complexity and interdependencies of public and private, general and local, infrastructural, constructed and environmental factors. In this regard, therefore, the idea of a consortium (subjecting private interests to public interests), the idea of a large scale (articulating general systems with local systems, infrastructure with constructed and environmental systems, including the social diversity) and of long term (triggering effective actions based on open and flexible group work – "project's ground zero" -) seem to make up the three major lines over which the contemporaneous urban transformation strategies for the city of São Paulo should be based. These strategies are aimed at the promotion of more intense, qualified and inclusive occupation forms of the urban space, articulated to measures that rationalize and democratize the use of infra-structure and social equipment networks.

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7.2 Contaminated site management and brownfield redevelopment in Latin America

Andreas Marker, Andreas Nieters, Detlev Ullrich

ABSTRACT

Regulators and planners, national and local governments in urban industrialized regions of Latin America are becoming increasingly aware of the challenges and opportunities related to the redevelopment of abandoned inner urban degraded areas and the management of contaminated sites. Countries with rather advanced legal and institutional frameworks in regard to the contaminated land issue like Mexico and São Paulo State, Brazil, already execute brownfield redevelopment, while most countries and especially local governments do not yet fully realize the potentials or are not aware of hidden risks. Examples from selected regions and cities in Latin America are given to show, how brownfield redevelopment is being put into action and how German and European stakeholders in the present and in the future may participate to promote the issue.

Introduction

Inner urban brownfield redevelopment and management of contaminated sites are emerging issues in Latin America, especially in the metropolitan centers of mega cities like Mexico DF, São Paulo, Buenos Aires and Rio de Janeiro, where industrial production and strong demographic concentration have led to profound social and environmental impacts. The often unbalanced social and economic conditions challenge sustainability and also affect environmental assets like the soil, water and groundwater. Urban sprawl results in uncontrolled settlement on former industrial or commercial areas as well as waste dump sites, not seldom driven by poverty, whereas inner urban town areas suffers from social and environmental degradation. The chance f urban revitalization should be used to improve environmental conditions and promote a more sustainable urban development. European experiences can show the need to implement legal frameworks and to support institutional development, establish cooperative management models and networking, promote public-private partnerships and create financial incentives. The transfer and exchange of know-how and technology have proven to be effective, but require a high degree of adaptation. The initiatives here presented to establish policies to protect soil and groundwater and add value to inner urban development are not comprehensive, since they focus on selected countries; however they seem to be representative for the region. The experiences carried out within the scope of the European-Latin American cooperation highlight the need for these projects, on the other hand reveal the legal, institutional and infrastructural differences that require specific and adapted concepts.

Cooperation initiatives

Brownfield redevelopment and management of contaminated sites are intrinsically co-related. This becomes even more evident in a continent, where the protection of the soil and groundwater are just beginning, as far as regulatory, legal and institutional structures are concerned.

On behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation) since the beginning of the 90's has been supporting Latin American regulators, environmental ministries and agencies to build up capacities for environmental management. Among others, contaminated site management has become an important issue in the environmental debate, especially in the great urban-industrial centers of the region. Industrialization and exploitation of natural resources has left its marks on the urban land, and countries like Brazil, Mexico, Chile and Argentina have recognized the need to deal with the issue of industrial pollution and one of its severest but still underestimated effects: the contamination of soil and groundwater. The main efforts in regard to building up institutional capacities for contaminated site management were undertaken by GTZ in Brazil – mainly in the state of São Paulo, Mexico and Chile. The experiences in these countries have shown, that contaminated site management and law enforcement will have implications on land use related issues such as urban planning, real estate market and property. GTZ soon realized that the contaminated site management issue has to be dealt with in a multistakeholder approach, involving, in addition to the regulators and environmental authorities, also urban planners, financing institutions, consultants and the real estate market. Thus the importance of the brownfield issue was recognized. Experiences made by GTZ in Brazil show how a technical and regulatory framework on contaminated site management established in the State of São Paulo influenced national awareness building and triggered regulations, thus disseminating the issue on the local level and in relevant sectors (construction, banks, real estate) and consequently leading to the establishment of regulation concerning land use in some municipalities and moving the private sector and investors to a behavior of environmental due diligence.

In Brazil, GTZ cooperates with representatives of almost all above mentioned stakeholder groups: the Federal Environmental Ministry (Ministério do Meio Ambiente – MMA) and the State environmental agency of São Paulo – (Companhia de Tecnologia de Saneamento Ambiental – CETESB), the Municipalities of São Paulo and Rio de Janeiro, the Federal Loan and Savings Bank – (Caixa Econômica Federal - CAIXA) as well as consultants and associations related to the issue. Apart from the bilateral cooperation with these stakeholders, GTZ supports the networking amongst them, which has led to some major success stories and initiatives in the field of remediation and brownfield redevelopment, training programs and realization of events, also in cooperation with the private sector. Figure 1 gives an overview of the activities of GTZ which have been commissioned by the German Government (BMZ). It also contains information on cities involved in the REDESC project, coordinated by the city of Stuttgart and funded by the EU program UrbAL (REDESC, 2005).

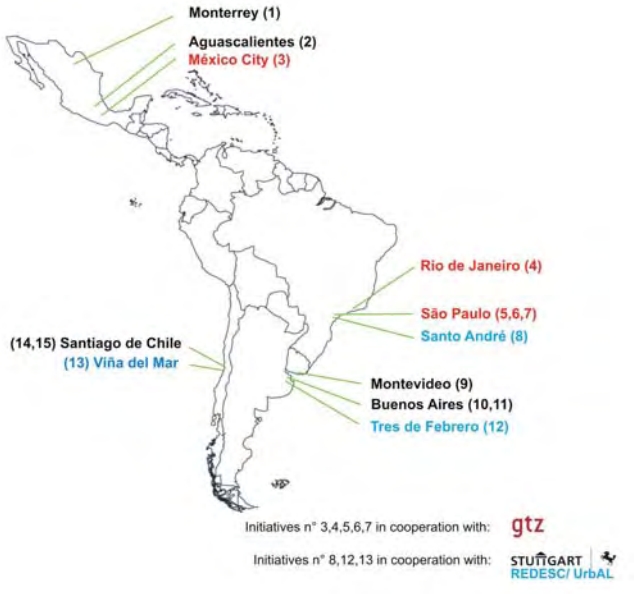

Figure 1: Selected initiatives in the field of contaminated site management and brownfield redevelopment in Latin America, 2007.

Contaminated Site Management in Latin America

Industrialization during and after World War II, intensive mining exploitation and beneficiation of raw products like ore, crude oil, timber as well as enhanced industrial growth, especially of metallurgy, metal transforming and chemical industry in the 60's and 70's left its traces on soil and groundwater. Legislation on solid waste management and licensing of pollutant industry is rather recent in LA countries. Rapidly increasing population concentration in urban centres and metropolis, e.g. Mexico, São Paulo, Rio de Janeiro and Buenos Aires turned the issue of solid waste disposal even more critical, since installations were often not controlled and inner urban space became scarce and expensive. The result was obvious: landfills contaminated the soil and groundwater and jeopardised human health. In the late 80's and early 90's, a new cycle of economic reorientation and the increasing infrastructural difficulties in the mega-cities led to the exodus of industries, as happened in Europe 15 years earlier. The resulting derelict land preserved stigmas of contamination and degradation, remained abandoned and started attracting dwellers and illegal or informal occupation. Urban planners and regulators were aware of the problems, but only in the last years, these issues are gaining more importance and consideration as far as legal frameworks and more sustainable urban development strategies are concerned.

National and state regulations

A common characteristic of all countries is the lack of a specific legislation on the contaminated land and soil protection issue. Mexico's National Ministry of Nature and Environment (Secretaría de Medio Ambiente y Recursos Naturales – SEMARNAT) regulated responsibility and liability issues in the frame of its solid waste act of 2003, reviewed in 2006. A recent ordinance defines procedures for investigation, risk assessment and remediation as well as legal responsibilities. (SEMARNAT, 2006). Also soil quality and remediation standards for soils contaminated by hydrocarbons, PCB and heavy metals are available.

Brazil and in particular São Paulo State have submitted draft bills on soil protection and contaminated site remediation, but are still treating the issue with existing laws on pollution control, like the São Paulo State Law 996 and its ordinance of 1976. São Paulo presently deals with the

issue mainly by institutional guidelines and directives such as the guide values for soil and groundwater, directives for risk assessment and investigation procedures "Manual de gerenciamento de areas contaminadas" (CETESB, 1999).

Generally spoken, the predecessors of legal and normative frameworks in all countries are programs, which are present or underway also in Argentina, Chile and Uruguay. The National Commission on the Environment (Comisión Nacional del Medio Ambiente – CONAMA) in Chile is presently preparing a national policy on the management of contaminated sites (Contreras, 2006). These programs aim at establishing procedures on site investigation and remediation, including site inventories and priorization like the national program PROSCID – Programa Nacional para la Gestión Ambiental de Sitios Contaminados in Argentina (Secretaría de Ambiente y Desarrollo Sustentable, 2006) and the program on contaminated sites of Uruguay's National Environmental Agency "Direción Nacional del Medio Ambiente – DINAMA" (Savorin, 2006).

Inventories of contaminated sites are rather well developed in the state of São Paulo, where already almost 2000 sites have been registered, investigated and partly remediated. Mexico is presently building up its inventory SISCO – Sistema Informático de Sitios Contaminados and has already started a program for national priority sites. Both Mexico (SEMARNAT) and São Paulo State (CETESB) and to a lesser extend Chile (CONAMA) have received considerable technical support from GTZ to build up institutional capacities for contaminated land remediation programs and policies in the framework of bilateral cooperation projects (Figure 1).

Local governments, public funding and real estate transfer

Basic challenges regarding the brownfield issue like the regulation and permission/ licensing of site reutilization, the liability question, the competence distribution between the different administrative spheres and the public funding of orphan and abandoned sites are not yet solved in the Latin- American countries.

Evidently, the reutilization of contaminated and depends on the establishment of standards for soil use and the tight cooperation between environmental and local urban planning authorities. In São Paulo City, we see first attempts to streamline the licensing process for construction projects. The occupation of contaminated soils is orientated by soil use-related guidance values and the contamination situation is proposed to be fixed in the public registry of the property. Almost all new real estate and building projects have to undergo environmental site assessment terrains have potentials of being contaminated.

The CAIXA, Brazil's main financer of urban development, housing and basic sanitation, has recently implemented risk management procedures and tools in the credit sector, based on environmental due diligence. The "REVITA" project in cooperation with GTZ tests and applies the tools in the metropolitan regions of São Paulo and Rio de Janeiro, where several residential building projects sponsored by CAIXA have already caused financial and juridical losses because of soil contaminations detected too late and where on the other hand under leadership of the town planning departments, revitalization of derelict city areas with a great number of former industrial sites is being promoted.

In Mexico, the liability issue on real estate transfer is covered by the ordinance of the solid waste act of 2006 (SEMARNAT, 2006). A special guideline which aims at the permission for real estate transfer and regulates liability is under development. Authorization of reuse of contaminated sites is established in the frame of risk assessment and remediation. Besides these examples, no comparable instruments which prevent the occupation of contaminated sites are known from other countries. Public funding for remediation

of contaminated sites which underlies the control and responsibility of the federal government (abandoned sites) are applied to the remediation of priority sites in Mexico. In the case of contaminated sites of the petro-industry, PEMEX (Petróleos Mexicanos) finances the remediation measures entirely.

The private consulting and remediation sector

Generally spoken, the private consulting sector providing services in remediation and investigation is not yet fully consolidated and structured. In Mexico, SEMARNAT published (May 2006) (SEMARNAT, 2006) a list of 169 authorized service providers for contaminated sites investigation and remediation. A project to prepare the certification process is proposed for 2008. Brazil, especially the region of São Paulo suffers from the great heterogeneity of professional qualification. About 12 companies are organized in AESAS, the Brazilian association of specialized consulting companies, however without any official certification. Relevant international companies from Germany, Europe and US are present or have joint ventures with local companies, and mostly offer services of high quality, while many small and less prepared consultants appeared in the last years on the presently booming consulting and investigation market. The upcoming market for brownfield redevelopment, the need of remediation of hundreds of gasoline spill and especially the generated impact of the renewable licensing procedure of industries (110,000 industries in SP State) require more qualified service providers, certification and quality management.

Cleanup and disposal infrastructure is to a certain degree existent in Brazil and Mexico, where hazardous waste disposals, co-processing and hazardous waste incineration are part of the solutions for contaminated soils. However, there is relatively little know-how and service provision for the management of construction debris, controlled demolition, physical soil cleaning (soil washing) and off-site bioremediation.

The academic sector is also an important service and know-how provider. In Mexico, for example, partnerships with several universities like the Universities of Aguascalientes and San Luis Potosi supported the elaboration of instruments and the implementation of remediation and redeveolpment concepts. In Chile, the Fundación Chile, a privately organized research and development center, supports the CONAMA in its efforts to establish contaminated site management instruments.

Brownfield redevelopment in Latin America

Urban development aspects

Urban development is intrinsically related to cycles of economic development like the rural exodus caused by industrialization in the 60's and 70's of the last century. This resulted amongst others in important transformations of cities, commonly called urban sprawl. The population in the largest metropolitan areas in Brazil doubled between 1970 and 2000. At the same time the population of their suburban peripheral areas has more than tripled, threatening environmental systems such as, for example, the Atlantic forest system of Southeastern Brazil, that still form the greenbelts of cities like Rio de Janeiro or São Paulo. The demographic growth of the great metropolis is very unbalanced. While the center of the cities are loosing population (for example, São Paulo about 3% per year), its suburbs are growing fast (in São Paulo, up to more than 5% per year) (Cidade de São Paulo, 2004). On the other hand, city centers started to change their functions in the late 80's and early 90's, and industries yielded space to service related sectors, logistics, administration and commerce. The exodus of (polluting) industries to peripheral areas of mega cities was, amongst others, caused by problems in transportation and infrastructure, by environmental re-

strictions and tax disadvantages. Like in Europe and the US, this process resulted in unemployment and social degradation, creating derelict land in inner urban city centers.

However, old production sites are beginning to be reused, but the conversion process generally happens without investigating their environmental history. Soil quality is not yet a relevant factor taken into account in urban planning and land use. This doubtlessly led and still leads to major conflicts and negative economical impacts, enhanced by the social situation. Inner urban shanty towns with extreme misery grow on to the degraded and contaminated sites like for example waste dumps, abandoned factories and degraded industrial zones, frequently jeopardizing human health. First economic and social impacts are experienced, like in the case of the "Barão de Maua" housing complex in São Paulo Metropolitan Region. Built on an old hazardous waste dump, toxic gases put at risk human health and are presently leading to the proposal of the demolition of several housing blocs. In this case, financial losses for banks, owners and builders are estimated in the range of several million USDollars would be unavoidable.

Urban revitalization and management of

contaminated land From the preceding chapter it becomes evident, that urban regeneration is an important emerging issue in urban centres of Latin America. On the other hand, the issue of contaminated land management widely lacks legislation, appropriate institutional structures and financial resources to cope with the problem.

Since there is no or only a weak legal and institutional framework that regulates land use in dependence of soil quality it makes it difficult to consider "brownfields" as a really existent issue of public policy. Brownfields are defined as inner urban areas which represent obstacles to economic, ecological and social development because of a suspicion or real existence of contamination hindering their development. From this definition it is obvious that the promotion of the brownfield issue, in its proper sense, requires that soil contamination becomes an environmental issue to be legally enforced. As a general hypothesis, with some exceptions, this prerequisite is not yet met in Latin America.

Presently the following situations in respect to the reutilization of contaminated land are observed in Latin America:

1. The importance of contaminations of soil, groundwater and building material for the reutilization (and the related impacts on human health) is still not recognized or contaminations are in fact known, however do not represent a financial and legal restrictions for reutilization, because of lack of legislation, control and enforcement. Missing integration of planning and enforcement institutions enhances the problem. This results in a low liability and low financial risk for the investors. Summing up, the existence or suspect of contamination does not have any influence on the feasibility of real estate enterprises.

2. Soil and groundwater contaminations are properly identified and assessed and legal requirements are taken into account. The high real estate market value turns brownfield redevelopment by private investors feasible; environmental investigations and remediation/ cleanup measures do not compromise the financial viability balance.

3. Soil and groundwater contaminations are identified, and properly managed. The legal and financial risks are evaluated. Brownfield redevelopment, however, needs external incentives to be implemented. These sites constitute the real chal-

lenge for the brownfield issue in Latin America.

Urban revitalization policies promoting brownfield redevelopment

In order to change the panorama mentionedabove, it is very important to implement publicpolicies that consider the sustainable use of theurban areas, trying to reduce the urban sprawl andthe social and environmental degradation of innerurban town areas by promoting inner urbandevelopment.

In most of Latin-American metropolises, localor federal governments, as well as the private sector, have already recognized the economic potential of revitalization of inner urban areas. This can be triggered by the implantation of recreation and culture attractions, like in the case of the harbors of Belém in Brazil or in the case of Puerto Madero in Buenos Aires, Argentina. It also may be motivated by policies to combat social degradation, as in the case of the urban rehabilitation program of the City Center of São Paulo "Programa de Reabilitação Centro" or stimulated by the interest to create new city districts focusing on commercial activities and housing pools, like "Ciudad Parque Bicentenario" in Santiago de Chile or the Technology Park "Del Cerro" in Montevideo, Uruguay.

Chile

The "Ciudad Parque Bicentenário", located in the Metropolitan Area of Santiago de Chile, is a good example for urban revitalization, transforming the former "Los Cerrillios" Airport of 250 acres in a new self-sufficient urban district with 15.000 housing units, commerce, small industry, new green parks and culture and recreation options for 50,000 new inhabitants. This huge urban re-qualification project, expected to be completed in 2010, is based on a local Master Plan (El Plan Maestro). The implantation of infrastructure and housing, realized with the participation of private investors, is managed by the Ministry of Housing and Urbanism (Ministério de Vivienda y Urbanismo) (Ministerio de Vivienda y Urbanismo, 2006). Existent contamination of soil and groundwater by fuel hydrocarbons apparently was not a hindering factor for the implementation of the project.

In Viña del Mar, potential brownfields exist in the former industrial district "El Salto" and in the abandoned and contaminated seaside fuel deposit "Las Salinas", both with a great potential for urban revitalization. Although Chile does not yet have an appropriate legislation for managing contaminated sites on national level, the brownfield issue is slowly becoming a challenge and motivates the municipality of Viña del Mar to apply instruments of site assessment to orientate in the future the reutilization of contaminated sites, supported by the UrbAL project REDESC (Solari, 2006).

Argentina

Another example for urban revitalization of degraded and at the same time very attractive areas is the old harbor project "Puerto Madero" of

Buenos Aires, Argentina, where mainly commercial and recreational activities have been created. (Puerto Madero, 2007). Former infrastructure of the port was recycled. However, no information about a pre-existing contamination situation is available. For the "Riachuelo-Matanza" basin in the southern district of Buenos Aires, which hosts 60% of the major industries of Buenos Aires, brownfield redevelopment activities are intended. Potentially contaminated sites are presently being mapped. One of the main sites identified for redevelopment is the federal junk yard in "Vila Lugana", a 140.000 square meters property contaminated with lead, acids, hydrocarbons and solid waste. The creation of housing projects and commercial activities is under evaluation (Picolotti, 2006).

Mexico

The strategy to finance the remediation of some of Mexico´s priority contaminated sites clearly gears to its re-usage. Brownfield redevelopment is seen as an opportunity to finance or co-finance the often costly cleanups of the sites, returning them to the economic cycle after remediation. This policy is applied to some state owned sites, for example the former PEMEX (Petróles Mexicanos) refinery in Mexico DF as well as orphan sites like "San Felipe Nuevo Mercurio" in Zacatecas State. Success stories and best practices of brownfield redevelopment from the cities of Agauscalientes and Monterrey are described in the next chapter.

São Paulo Metropolitan Region, Brazil

In São Paulo City, one of the main instruments of sustainable urban development is the "Consorciated Urban Operation" (Operação Urbana Consorciada). The strategic Master Plan (Plano Diretor Estratégico PDE) defines nine areas of Consorciated Urban Operation, where the local government, through specific laws, intends to develop and revitalize degenerated urban and social districts. The financial resources come from the "Outorga Onerosa", an urban planning and compensation instrument which gives the private initiative the possibility to buy the right to construct above indices foreseen in the zoning legislation, participating indirectly in the investment in urban infrastructure.

A recently developed Urban Operation is the "Operação Urbana Diagonal Sul" (Southern Diagonal). It covers an area of 2000 hectares, extending throughout the valley of the river Tamanduatehy in the inner city of São Paulo, further on links to Santo André's Tamanduatehy urban development axis. The region of "Diagonal Sul" represents one of the main industrial districts of São Paulo, nowadays in clear decadence, with huge industrial ruins like Ford Automotive, Antarctica brewery, and several metallurgy, metal transforming and chemical industries and the old installations of the Federal Railway (Rede Ferroviária Federal – RFFSA). Altogether, of the 329 existing industrial areas in the region with potential of being contaminated, about 40 major abandoned sites have already been identified and pre-assessed for redevelopment.

Main goals of the local urban development program, that counts on financing of the Inter American Development Bank – IDB, are: implementation of urban infrastructure, modernization of the railroad, recovery and revalorization of the industrial patrimony, housing and social infrastructure, management of contaminated sites and creation of new parks and green areas (Sales, 2006). In this context, an appropriate suitable identification methodology as well as criteria for the redevelopment of former industrial sites with suspicion of contamination and high potential for revitalization has been developed with the support of GTZ. The urban development program "Operação Diagonal Sul" is a first step for the implementation of a brownfield redevelopment strategy, because, for the first time in Brazil, it considers soil contamination as an important issue for future urban uses of derelict urban areas.

Santo André City, located in the Southern part of the metropolitan region of São Paulo, has already redeveloped several contaminated sites, mainly motivated by private interests, but well oriented by an appropriate local legal framework. The new federal University is presently being built on a brownfield, an old municipal vehicle workshop site. Both municipalities, São Paulo as well as Santo André, actually have legal and normative regulations which do not allow the reuse of contaminated sites without previous investigation, risk assessment and eventual remediation (Vaz, 2006).

Rio de Janeiro City

The municipality of Rio de Janeiro is presently implementing the Integrated Rehabilitation Plan (Plano Integrado de Reabilitação - PRI) of São Cristóvão. This district, which was the residential area of the nobility in the imperial period, has gone through profound transformations in the last decades, losing its industrial activities and consequently, between 1991 and 2001, 13% of its resident population. The "PRI" intends to change occupation characteristics into residential and commercial use, reutilizing abandoned or underused former industrial areas (Cidade do Rio de Janeiro, 2006). The municipality, in partnership with the CAIXA, elaborated an inventory identifying 167 properties, all of them with a high potential for housing projects. The study also identified about 20 abandoned former industrial sites. With the support of GTZ, vestiges of soil contamination were identified and evaluated, although a contaminated site management is not yet legally required in the construction licensing process. Currently, CAIXA is planning social housing projects (funded by public loans) on abandoned sites in São Cristóvão, creating up to 10,000 new residential units. More than 1,500 units are planned on former industrial sites, like the former ceramic industry where detailed investigations are under way (Figure 2).

Figure 2: Brownfield redevelopment project on an abandoned ceramic factory site, Rio de Janeiro.

As already mentioned above, CAIXA is presently, with the support of GTZ, developing instruments and procedures of environmental site assessment which guide the loan business in housing construction on former commercial and industrial sites with suspicion or potential of soil or groundwater contamination. Furthermore, products and services for the promotion, support and funding of brownfield redevelopment initiatives on a local level are to be elaborated with the objective to qualify the bank to be a proactive broker of brownfield redevelopment.

Best practices and success stories of brownfield redevelopment

Best practices and success stories of brownfield redevelopment in Latin America are still scarce. They do exist, where policies on state or local level shifts their priorities from the traditional issues like transportation, infrastructure or public safety to sustainable urban development, where public or private funding exists and where environmental laws, control and enforcement are predictable to give security to private investments.

In this context, the project "**Railway Workshops**" in the Mexican city of Aguascalientes represents a very illustrative showcase. The property of the more than 100 year's old industrial installations, occupying an area of 89 acres, was transferred from the former National Railway Company to the state government. At present, new commercial, administrative and recreational activities are being implanted. Innovative remediation technologies, soil management and soil re-usage strategies, under the new and modern solid waste ordinance, are implemented (Miramontes, 2006).

The "**Parque Fundidora**" in Monterrey constitutes a good example of brownfield redevelopment, transforming a symbol of industrialization into a very attractive recreational and culture area. The former privately owned metallurgy plant "Peñoles" was transferred to the state of

Nuevo Leon, which redeveloped the area in the context of the State Development Plan 2004-2009 in two separate phases, first the smelter plant and in a more recent phase the area of smelter sludge deposition. Remediation and the implementation of the park are orientated by onsite investigations and risk assessment studies of 2005 and 2006 (Estado de Nova Leon, 2006).

The recently initiated "**Sumidouro**" Project, located in the district of Pinheiros, São Paulo (Figure 3), represents an excellent example for public driven brownfield redevelopment, focusing public-private partnership as the main instrument of financing remediation. The project management is based on an intensive inter-institutional cooperation. The terrain of the old central waste incinerator "Sumidouro" is contaminated by heavy metals in soil and groundwater, while in the building material were found dioxins and furanes. The private investor is financing the confinement and remediation measures of the soil and in the building, as well as the creation of the new public park and the new educational and culture center. (Motta, 2006).

Figure 3: Brownfield redevelopment of the abandoned incinerator site "Sumidouro" in São Paulo.

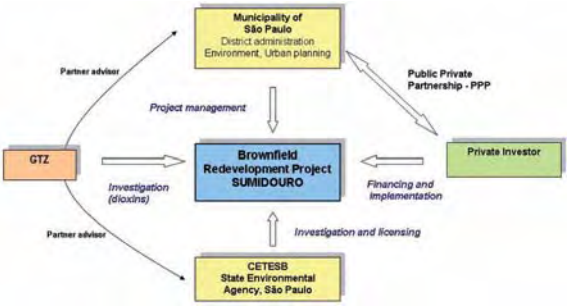

Figure 4:
Stakeholder-map of the brownfield redevelopment project "Sumidouro", São Paulo.

As shown in Figure 4, the project's public stakeholders are:

- the district administration of Pinheiros, in charge of the project management,
- the municipal environmental department, in charge of the elaboration and monitoring of the remediation and revitalization plans,
- the state environmental agency CETESB, in charge of licensing, establishment of remedial goals and supporting investigation logistics and technology.

In this case, GTZ acts as a facilitator as well as a technical consultant, both in the context of technical cooperation projects with CETESB and the São Paulo Municipality.

The "Sumidouro" Project may become a prototype for future brownfield redevelopment initiatives in São Paulo because it integrates public incentives, professional inter-institutional project management, modern soil remediation management and technology, as well as the involvement of private investors.

Challenges and demands

There is still a wide heterogeneity both in contaminated site management as well as in brownfield redevelopment in Latin America. Urban land still does not have its value influenced by soil quality and contamination, neither soil contamination always implies in soil use restrictions. As a general hypothesis, brownfield redevelopment is still not a real issue in urban planning and environmental management in Latin America. Nevertheless, GTZ experiences in Latin America show, that an appropriate legal and normative framework, like in Mexico and São Paulo State, are prerequisites for the promotion and implementation of brownfield redevelopment strategies and programs.

The experiences in the field of **contaminated land management**, centered especially in SEMARNAT/Mexico and CETESB/São Paulo, are worth to be multiplied in other countries of Latin America, like for example: legal framework, management tools and instruments, decentralization processes and inter-institutional cooperation, certifying instruments and quality control of the private sector, public-private participation models as well as the participation of the academic sector in the implementation of remediation projects.

The issue of **brownfield redevelopment** is a rather new challenge and for this reason, the demand is not very clear yet. It depends, as lined out above, on the consideration of soil and groundwater as an important asset. The cases described in this article show, that there already exist experiences with urban revitalization and rehabilitation, however, not always under the light of brownfield redevelopment. Sustainable urban development should take into account the need to revitalize inner city areas by using strategies to redevelop brownfields, trying to reduce urban sprawl and protect "greenfields". One of the most important future challenges is to harmonize environmental management, urban planning and economic requirements. There is a great demand for clear legal and regulative orientations to support urban planning and guarantee reutilization of contaminated sites by use-oriented remediation goals, legal or guide-values, risk based assessment as well as clear liability orientations for investors and new owners.

Depending on the political and administrative structure of the countries, national, state or local governments constitute the central promoters of brownfield redevelopment, with emphasis on local governments in Brazil and state/national governments in other countries. In some cities there already exists know-how in urban and architectonical development of underused urban areas, PPP driven financing models, appropriated reutilization concepts, as well as marketing strategies.

Brownfield redevelopment, as becoming

evident by the European and US- American experiences, is generally in the competency of local governments, frequently supported or even driven by state and national financing. In this context it is necessary to develop and implement project steering mechanisms and management models of brownfield redevelopment at the local level, involving urban planning, economic and environmental competences. Local governments are recommended to develop and qualify institutional capacities on implementing instruments and strategies to incentive brownfield redevelopment, such as public start up funding, tax incentives, as well as special marketing activities and environmental communication instruments, which give information's to possible investors an may help to reduce the stigma of brownfields.

The demand for qualified professionals and capacity building in this working area is evident. Here European and US-American experiences can give important inputs. The availability of instruments to calculate and evaluate the cost/benefit of brownfield redevelopment and of innovative models for soil management which

turn feasible cost reduction through recycling and adequate disposal of construction rubble are essential to be known in Latin America. These instruments assure positive ecological balances and help turn brownfield redevelopment sustainable.

Perspectives

In the region of Latin America exists a great demand for the exchange of experiences and know-how and inter-institutional cooperation and forums of discussion. This is justified by the existence of considerable competency in Brazil and Mexico and the fact that contaminated site management and brownfield redevelopment is emerging in most of the Latin American countries. Therefore it seems more than natural, that these existing competencies should be multiplied in the region (to avoid the re-invention of the wheel over and over again). Furthermore the interchange and cooperation between the region and Europe, especially as far as the brownfield issue and new and innovative topics and solutions are concerned, should be guaranteed in the future.

A first attempt was made by CETESB and GTZ in cooperation with other Latin American partners to build up a "Latin American network on control and prevention of soil and groundwater contamination" (CETESB, 2007). The multistakeholder network gears to the exchange of knowledge and experiences in the region, promoting discussion forums, seminars and workshops, and shall provide the exchange of with Europe through the recently firmed partnership between CETESB and the German Federal Environmental Agency UBA. The network is expected to formally take up its activities in 2008.

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7.3 Remediation and Revitalization of the former Workshops of the National Railroads of Mexico

Ruiz Saucedo Ulises, Pérez Gallegos Juan Gabriel, León Barrera José Guadalupe, Rodríguez Reza Luís Homero, Llamas Viramontes Javier

ABSTRACT

In Mexico, like in many other countries of the world, a growing interest exists in developing methodological frameworks that offer solutions to existing environmental problems. The remediation of contaminated sites requires the implementation of strategies that are technically and economically feasible, as well as environmentally sustainable. The fundamental scope of this achievements is the clean up and the urbanistic reincorporation of contaminated sites into the economic cycle for the future use and the benefit of society. With this focus the remediation and redevelopment of the former station and workshops of National Railroads of Mexico (WNRM), located in the city of Aguascalientes, still been carried out.

In the past century, the historical, social and economic development of the State of Aguascalientes was closely connected to railroad activities. Since 1898, the WNRM provided maintenance and executed repair of locomotives and other railroad equipment. Up to the decade of the 70´s the Aguascalientes workshops were considered the biggest of the Mexican Republic and Latin America. They occupied 2% of the surface of the city. After 107 years of operation, the WNRM closed and became part of the patrimony of the state.

The urbanistic revitalization and the remediation of the degraded railroad site were part of an integrated strategy and different studies were carry out to identify the demands of the community and to satisfy the economic development plans of the city and the State of Aguascalientes. With the firm purpose of preserving the historical patrimony of the place, the revitalization project considered the architectural and historical characteristics of the different buildings as a priority. The project proposal considered the creation of different kinds of spaces to encourage and allow recreational, educational, healthcare and commercial activities.

With the aid of the site characterization clean up criteria for soil and buildings were established, in order to achieve acceptable health and environmental risk levels.

The risk assessment considered the toxicological characteristics and the environmental dynamics of the most dangerous pollutants for different exposure scenarios according to the future use of each area. In the follow up remediation actions based on threshold limits for petroleum hydrocarbons and heavy metals were established. In areas with high levels of contamination clean up criteria were es-

Figure 1:
"Locomotives Repair" Building, before restoration

tablished considering "short times" exposure scenarios. In areas with lower levels of contamination, remediation actions were carried out with conservative clean up criteria in order to meet requirements for recreational, cultural, commercial and healthcare activities.

In the first phase of the project, the remediation of contaminated areas and buildings was achieved with economic resources supplied by the government of Aguascalientes. Today the recuperated and rebuild areas has become recreational interest of regional and national attractiveness. An example is the "locomotives repair" building (picture 1 and 2), built in 1906, is a faithful representative of the ancient time of the railroad splendor. The restoration works conserved the main structural and operative elements in such a way that the visitor enjoys a pleasant space and an educational walk through the building, exposing a great quantity of historical objects that illustrate the working environment of former times at railroad works. The building is already been used as a convention center.

For the near future the establishment of spaces for commercial purposes is envisioned. It is expected that the following stages of the revitalization project will be financed with resources from the private sector. The project is considered a great contribution to the preservation of the historical and social patrimony of the state of Aguascalientes and represents an economic impulse for the region.

Figure 2:
"Locomotives Repair" Building, after restoration
(Now convention center)

7.4 "TAMANDUATEHY AXIS" PROJECT – Brownfield Revitalization of Contaminated Areas in Santo André - Brazil

Sebastião Ney Vaz Junior

ABSTRACT

The industrialization of the municipal district of Santo André was territorially and strategically linked to Rio Tamanduatehy's valley and the Santos – Jundiaí Railroad, which made it possible to transport products to the Santos Harbour, turning the municipal district into one of the main Brazilian industrial pools. Starting in the seventies, the municipal district of Santo André went through an intense industrial degradation process, caused by productive restructuring and social economic changes in the Brazilian Industry. Such restructuring generated derelict areas in several parts of the municipal district causing social and environmental degradation. The "Tamanduatehy Axis" Project is an initiative of the Municipality of Santo André and seeks to facilitate the environmental, economical and social revitalization of the former industrial area at Rio Tamanduatehy's valley, focusing Brownfield redevelopment.

Introduction

The "Tamanduatehy axis" Project is located at Tamanduatehy's valley, including an area of 12.8 km2. The project is characterized as one of the main urban development initiatives in the municipal district of Santo André – located in the metropolitan area of São Paulo in the State of São Paulo –Brazil.

Figure 1: The Tamanduatehy urban development axis in Santo André, Brazil

Historical aspects

Santo André was founded in 1553. In the second half of the 19th century and following the process of Brazilian urbanization, the municipality went through a more intense urbanization process growing to 660.000 inhabitants presently. The economy of the municipal district was characterized by the implementation and expansion of mainly chemical, metal transforming and mechanic industry, starting in the twenties through the seventies with a peak of activities in the fifties.

In the late seventies, the municipal district of Santo André started suffering from the impacts of deindustrialization as a result of changes in organization of em-

ployment and production. The social and economical demands arising from this process required interventions to revitalize the abandoned industrial areas.

The "Tamanduatehy axis" Project

Motivated by the socioeconomic and urban changes that resulted from the economical restructuring process, Santo André's government in 1998 decided to face the and establish an agenda for urban and economic development. The "Tamanduatehy axis" urban development project was part of that strategy, and involved the implementation of public policies to foster local development, and reduce the vulnerability degree related to economic variables.

The "Tamanduatehy axis" project combines the efforts of the local Public Power, private sector and the community for social intervention, city planning, economic development strategically aiming at:

- implementing urban intervention along a strip of the territory of the municipal district, between the so called "Avenida dos Estados", the Railway and "Avenida Industrial", producing a new regional centre that brings benefits to part of the Greater ABC Municipalities and neighbourhoods of the City of São Paulo and fosters a polycentric metropolitan, regional and municipal integration;
- creating accessibility, changing the former railway transportation system into modern metropolitan trains, as well as improving traffic circulation in the municipal district and the Tamanduatehy area;
- integrating areas of the city that are currently separated by the railroad, by extensive industrial sites and by the Tamanduatehy river, using different means (bridges, catwalks, tunnels and green areas in the landscape), thus providing continuity and urban cohesion,
- fostering the implementation of commerce, services, housing and new industry.

Figure 2: Changes in occupation and economical development in Tamanduatehy axis, Santo André – construction of a shopping mall on formerly abandoned land

The main advantages of this urban area are:

- Privileged location in the metropolitan area;
- Availability of land for new enterprises;
- Consolidated infra-structure such as electric power, water, sewage and gas, telecommunications, and public transportation;
- Consumer market, being the third largest in Brazil ;
- Legislations allowing mixed residential and commercial use.

Urban development – state of the art

Urban interventions were promoted in the scope of a cooperation between the local government and private entrepreneurs, and a total of 38 medium and large size enterprises, being 13 of commercial use, 5 belonging to the service sector (three hotels), 10 industrial plants, 5 residential and 5 institutional enterprises were implemented, privileging the mixed use of activities in an area which was formerly predominantly industrial. A total area of 1,960 million m^2 of land was made available for new activities or the expansion of old uses.

Urban operations were implemented and supported by specific laws, having in mind that new and never licensed uses and activities should be established, which at that time still lacked legal frameworks. The results so far have been positive, with the promotion of the real estate market, new dynamics of land appreciation and expansion of the service sector such as hotels, universities, Shopping Malls, residential and business condominiums. The most significant examples implemented so far are: Shopping ABC Plaza, Mercure and Íbis hotels, TIM System, The Greater ABC Federal University among others.

The great challenge however is now to reconcile the new sensitive uses with the remaining industrial activities and appropriate re-utilization of areas with suspect or existing contamination, the so called Brownfields, risk warden and the elimination of their impact to environmental assets and human health. According to the contaminated sites inventory prepared by the State Environmental Agency -CETESB, about 30 areas have been registered as suspected areas in Santo André's "Tamanduatehy axis").

The Greater ABC's Federal University revitalization project

Presently the federal government is promoting a change of use in the property of the former municipal general workshops, to build a Federal University in this place. Here the municipal administration owned administrative buildings and vehicle maintenance workshops with underground fuel tanks, oil deposits, and electricity transformers in an area of about 700 m2.

Figure 3:Excavations of contaminated soil in the future Greater ABC Federal University, Santo André

Petrol hydrocarbon contamination was detected in the groundwater and has to be taken into account in the lay out of the architectural project of the university. A preliminary estimate of 50 soil and groundwater sampling points was made with a total of 100 soil samples and 50 water samples, to be analyzed for parameters in BETX, PAH, TPH, PCB and other chlororganic compounds, propagation modelling which takes into account the „jigging" effect of (dispersion) floods, risk assessment, excavation and treatment of about 15,000 tons of soil and polluted concrete in bio piles, pump and treatment of free phase and monitoring of the underground water.

SEMASA is responsible for part of the environmental licensing, the control and monitoring of the contaminated site remediation measures, the articulation with

other municipal and state agencies and for assuring the safe future use of the area. The applied methodology of site investigation and remediation are based on experiences carried out in the REDESC project in cooperation with the City of Stuttgart in the framework of the URB AL program of the European Union.

Conclusions

It is expected that the Federal University Project may be a pilot and showcase which motivates further Brownfield development in the future, although the project is ran by the public sector and counts exclusively on public financing. Future projects in the surrounding areas have to be implemented under conditions controlled by the market controlled and the cost/benefit must be evaluated case by case. The lessons learnt are undeniable, and the largest progress consists in the consolidation of guidelines and specific laws regarding the use and occupation of the soil, as approved and consolidated in the master plan. Another great value of the Tamanduatehy Axis project is the construction of new urban dynamics that promote social inclusion, environmental recovery, assuring the participation of the community and creating an appropriate atmosphere for the implementation of new enterprises and urban transformation with differentiated patterns for every area included in the project.

7.5 CAIXA ECONÔMICA FEDERAL – the Brazilian Federal Loan and Saving Bank Promoting Sustainable Urban Development

André Luiz de Souza Castro, Jean Rodrigues Benevides

ABSTRACT

Environmental degradation in cities, an inheritance of the peripheral growth urbanization model and socio-spatial segregation, these are the challenges and currently demands for Brazil and its federative entities towards an articulated development of urban policies. Caixa Econômica Federal - CAIXA along with the Ministry of Cities are in charge of implementation, operationalization and articulation of sustainable urban development policies, including brownfield redevelopment strategies. Ppresently, CAIXA is implementing environmental site assessment procedures and instruments which guide the loan business in housing construction on abandoned, sub utilized in downtown areas or former industrial sites. Moreover, products and services for the support and funding of Brownfield redevelopment initiatives on a local level are going to be elaborated with the objective to qualify the bank to be a proactive broker of brownfield redevelopment.

Introduction

The picture of environmental degradation in cities, an inheritance of the peripheral growth urbanization model and socio-spatial segregation, currently demands that the country and its federative entities work together with greater efficiency towards an articulated development of urban policies. Caixa Econômica Federal - CAIXA, along with the Ministry of Cities (Ministério das Cidades) which was created in 2003 as a result of this demand, is playing a major role in the implementation, operationalization and articulation of urban development policies.

In order to promote the continuous improvement for the quality of life of the population, CAIXA has, in the last few years, fomented the balanced and sustainable use of the urban soil as an essential mechanism for social and economic development of cities. This is a complex activity which requires that a series of institutional instruments, regulated the National City Bylaws (Estatuto da

Figure 1: Urban rehabilitation program of downtown areas In with CAIXA's support, Rio de Janeiro

Cidade), are used in an integrated manner (Brasil, 2001).

CAIXA is the major urban development fomenting agent in Brazil, in segments such as housing, environmental sanitation and urban infra-structure. In 2005 alone, R$ 13.6 billions were invested in housing and R$ 2.08 billions in environmental sanitation contracts, involving projects in water supply, sanitary sewage, urban drainage and solid waste. In agreement with the public policies of the Federal Government, CAIXA especially invests in the production of housing units, to fight the high Brazilian deficit in this area.

Policies for Urban Development

At a local level, the Master Plan is an extremely important instrument for urban management and has become mandatory for about 1,700 Brazilian municipalities in compliance with the City Bylaws. The Ministry of Cities in cooperation with CAIXA, promoted in 2005 a national capacity building and mobilization campaign aimed at supporting cities to carry out these plans in a participatory and inclusive manner. Currently, 78% of these cities have already prepared their Master Plans, an important milestone in the consolidation of urban planning as an effective instrument for the management of Brazilian cities. Furthermore, the Federal Government, represented by CAIXA, the Ministry of Cities, Ministry of Culture and other partners has recently established a new paradigm in the Brazilian urban policy incorporating the rehabilitation of downtown areas within its major framework. These areas, usually degraded, rather than hindering development, may be an important potential factor to trigger sustainable economic and social growth of cities, using already existing resources - buildings, infrastructure, as well as historical, cultural, environmental and social patrimony (Brasil, 2004).

As preliminary initiatives to consolidate this trend in Brazil, CAIXA launched in 2000 the Historical Sites Rehabilitation Program, and established a technical cooperation program with the French government, which intends to develop financial solutions, methodologies and specific instruments in urban rehabilitation. This experience supported the elaboration of a National Urban Development, by the Ministry of Cities, This policy establishes as one of its guideline that downtown areas should aim at population re-settlement with economic activities and low-income housing as opposed to the urban development model based on so called "urban sprawl" - the peripherization of the lower income population and abandonment and underutilization of consolidated areas provided with infrastructure.

Figure 2: Downtown Rehabilitation Program, Salvador de Bahia, Brazil.

Moreover, CAIXA has established partnerships with owners of large empty or underutilized estates in the major cities of the country to rehabilitate and integrate them with the city, such as the Union's Patrimony Secretariat (Secretaria do Patrimônio da União - SPU), the Federal Railway (Rede Ferrorviária Federal – RFFSA) and the National Social Security Institute (Instituto Nacional de Seguro Social - INSS). Among other actions, part of the national policies, two programs require special importance taking into consideration the urban inheritance of lack of planning and social-spatial segregation of Brazilian cities:

- Strengthening of Urban Management,
- Urbanization, Regularization and

Integration of Informal Settlements.

These programs operationalized by CAIXA, on behalf of the Ministry of Cities, have dedicated resources of the Federal Government to elaborate Community-Based Master Plans and to pursue land tenure.

CAIXA, finally, has expanded its participation in the urban policies of the Federal Government, establishing cooperation agreements to operate the major programs, and credit lines that reach a larger population group, especially for housing of social interest and establishing partnerships for technical and institutional support to the cities and ministries. These actions, when combined and articulated have a strong impact on city management, which in addition to strengthening its role as a major urban development fomenting agent, enhances its challenge to meet the needs of cities from different regions in the country.

Environmental site assessment and brownfield redevelopment in the context or urban revitalization

As shown above, CAIXA has carried out activities to encourage the redevelopment and revitalization of underused areas or in areas undergoing urban degradation.

The rapid Brazilian urbanization process, the demand for housing and services and the growth of cities was followed by a change in the urbanistic and socioeconomic profile of large cities, which has led to the need to occupy properties, estates and plots in areas where there used to be industrial activities or were used for solid waste deposit, often contaminated. Such conditions require prevention measures and precaution when defining the use of these properties to avoid human health risks for the population using or living in real estate around or at these plots, as well as to minimize operational and financial risks inherent to investments in enterprises in these areas, where contamination is suspected or detected.

Figure 3: Rehabilitation of abandoned buildings and former industrial sites, Mangueira, Rio de Janeiro

To cope with this situation, CAIXA, by means of the cooperation with the Federal Environment Ministry (MMA) and GTZ - German Agency for Technical Cooperation has developed, in the context of the so called "REVITA" project, procedures and instruments of environmental due dilligence to manage environmental and economic risks related to the reutilization of former commercial or industrial sites. The methodology consists of a sequential procedure, using simple instruments to identify contamination indices in plots and in the property periphery. In a second phase, a preliminary environmental site assessment leads to the characterization of contamination indices, its risk assessment and the elaboration of a scope for technical investigation measures thus providing guidelines for a confirmatory investigation, working as a economic and legal control instrument in the context of brownfield redevelopment activities.

The implementation of this methodology is accompanied by the capacity building of Caixa's staff. The pilot application and implementation of these procedures has shown to be effective in identifying plots which are inadequate for housing, therefore, avoiding human health risks and losses for Caixa and other stakeholders.

Conclusions

It is CAIXA's goal, as the main social and urban development agent of Brazil, in partnership with other stakeholders in the municipal sphere, to be prepared to safely invest in possible activities towards brownfield redevelopment, recognizing the economic potential of revitalization of degraded inner urban areas and at the same improve environmental and social conditions to promote a sustainable urban development.

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7.6 Experiences of cooperation between European and Latin-American cities in the field of Brownfield revitalisation

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ABSTRACT

The municipality of Stuttgart developed a procedure of contaminated sites management. Based on this, a strategy for sustainable Brownfield revitalisation arose in close cooperation of urban development, environmental protection, real estate management and economic promotion. These experiences were the starting position of the REDESC project, an European - Latin American cooperation project funded by the European Union. Five municipal partners from Latin America and European established a cities network. During the project, a wider cooperation with the German Technical Cooperation (GTZ) and CETESB, the state environmental department of Sao Paulo emerged. Thus a stable network could be established. Common international projects were proved to be an effective way of interchanging successful strategies for Brownfield revitalisation in an effective and enduring way.

Municipal experiences

In the 1980s, contamination in inner urban areas of Stuttgart generated considerable financial losses in the purchase and sale of plots of land. Since 1992 the city has developed and implemented a systematic management of contaminated areas. Thanks to the systematic registration of all areas suspected to be contaminated, it is possible to know today which sites are expected to contain harmful substances (Landeshauptstadt Stuttgart 2002). This way, experts on contaminated areas can develop adequate solutions in early stages of redevelopment, which guarantee both the required environmental remediation and a sustainable, efficient, and economic realization of Brownfields revitalization projects (PROSIDE-Partner 2006). A cooperation of urban development, environmental protection, economical promotion and real estate management was implemented. Thus it was proven that very often the required environmental remediation is only successful in interaction with urban regeneration measures. This way, a win-win situation could be reached in Stuttgart.

The interchange of knowledge and expertise, as well as the creation of networks, has proven to be an effective way of cooperation between different cities. These activities impart experts a good insight in the experiences and methodologies of other partners. The development of common projects produces even higher benefits, since these demand the additional adaptation and implementation of new work methods in the specific areas of the different partners.

The Municipality of Stuttgart, encouraged by promotional programs of the European Union, has participated in a variety of international projects in previous years. In

these projects specific measures are carried out exemplarily within a defined time and financial framework. One example of successful cooperation between Latin-American and European cities in the area of rehabilitation of Brownfields is the EU funded project REDESC. Based on the experiences gained, the project proposal REUSO aims at the integration of the public, private consulting, political and research sectors. More experienced partners from Europe and Latin America will transfer their knowledge to less experienced cities in Latin America.

The URB-AL Project REDESC – Rehabilitation of Contaminated Areas for the Sustainable Inner Development of the City

From 1995 to 2006, the Program URB-AL from the European Union connected and promoted a total of 13 thematic networks of cities and regions in Europe and Latin America. The network N°6 "Urban environment" aimed at the improvement of the socioeconomic conditions and the living quality of the population, especially through an adequate development of inner urban areas. In the framework of this network, Stuttgart applied for and coordinated the project REDESC, which began in March 2004 and ended February 2006. Partners in the project were the Province of Treviso (Italy), the Municipality of Tres de Febrero (Argentina) and the cities of Santo André (Brazil) and Viña del Mar (Chile) (REDESC-Partner 2005).

Figure 1: The REDESC-Partnership

In the REDESC Project, the partners had the chance of implementing different procedures for the investigation and evaluation of contaminated areas for the redevelopment of Brownfields. This was an ambitious and complex challenge, since a wide variety of aspects and interests needed to be taken into account and coordinated to attain this objective. An adequate management of environmental damages produced by harmful contaminants (such as dioxins, furans, solvents, pesticides, heavy metals and creosotes) demands experience and interdisciplinary cooperation.

With help of the REDESC project it was possible to organize and promote the necessary activation of private experts to carry out the investigations on the contaminated sites and to interlock remediation and urban development. The participants overcame their sectoral operation methods in favor of a networked methodology. The following questions were clarified on the part of the urban planning:

- Is the planned urban land use in a redevelopment project put at risk by existing harmful substances in the soils?
- Which remediation measures are required for the removal of the contaminants that affect human health?

In the course of REDESC, the partners developed strategies for the analysis of contaminated areas oriented to the future land uses. With this objective, the partners set specific goals according to their particular situations and aims. The work plans for each partner were established in three joint workshops. Additionally, in the workshops, the evaluation of the investigation results was undertaken and recommendations for following procedures were developed. The activation of private experts for the investigations on contaminated areas proved to be helpful and deciding for the continuation of the measures beyond the duration of the

Figure 2: Brownfield revitalisation

project. That was especially the case with the German Technical Cooperation (GTZ) and the environmental department of the Federal State of Sao Paulo (CETESB). This way it was possible to support the partners in LA in an efficient and continuous way. Thanks to the integration of CETESB it was possible to guarantee that all measures carried out were in accordance with the requirements of the competent supervisory authorities. As a result a robust network was established that remains after the conclusion project.

REUSO – A Brownfield revitalisation project proposal

The project proposal REUSO (Reuse of inner urban areas) , in cooperation with German Technical Cooperation (GTZ) and the Center for Ecology & Development (KATE as an NGO) is a project proposal that aims at the transfer of knowledge to cities in Latin-America. The main objective is the practical implementation of advanced strategies in Brownfield revitalization, based on the successful examples of Europe, Mexico and Brazil.

In REUSO, pilot projects will be implemented in Latin American cities. The measures aim at an integration of urban planning, environmental protection and financing strategies. A broad public and political involvement leads to an improved acceptance in the community, the politic and the public administration. New financing concepts like PPP approaches will be applied. The pilot actions will lead to an adoption of the methodology to the different national legislations and settings. Furthermore, the creation of a network between the municipalities involved will become a common basis for the exchange of experiences, especially by means of concrete projects.

The participation of citizens, especially from the neighborhood of the sites, will make the process more democratic and transparent. To attain this objective, REUSO provides measures for communication, discussion and diffusion of strategies, measures and results.

The involvement and integration of different institutions like public administration, research facilities, states agencies, other municipalities, or political circles will improve a broad acceptance of the strategies. The specific skills and competences of the practitioners and decision makers in the participating cities will be improved.

The duration of the project will be 4 years. Potential partners are Sao Paulo (Brazil), Santo André (Brazil), CETESB (Brazil), Viña del Mar (Chile), CONAMA (Chile), Bogotá (Colombia), Querétaro (Mexico), City of Milan (Italy), Province of Treviso (Italy), GTZ (Germany/Brazil), KATE (Germany), and Stuttgart (Germany).

REUSO is conceived as an international project within the "Latin American network on the management and prevention of contaminated land and redevelopment of Brownfields", in which partner cities of Latin America and Europe implement sustainable development concepts for the rehabilitation of inner urban areas, improving urban quality and guaranteeing ecological sustainability. REUSO aims at a sustainable urban development by reducing the demand for new settlement areas (slowing urban sprawl), revitalizing Brownfields and protecting and rehabili-

tating soils and groundwater.

Conclusions on the cooperation of European and Latin-American cooperation

The knowledge-transfer offers an important fundament for the improvement of the revitalization of Brownfields. However, it is important to take into account that even within Europe and Latin-America there are considerable differences concerning legal, organizational and conceptual aspects. This applies to both urban planning and environmental protection.

For this reason, common international projects are an effective way of interchanging successful strategies and adapting them abroad, within a framework of reciprocal support based on existing networks. Clearly defined projects, with previously stipulated measures and objectives, contribute considerably to a fructuous interdisciplinary cooperation. The realization of projects is an adequate way to guarantee the necessary adaptation of concepts to the specific legal and organizational conditions in the partner cities.

In the European-Latin-American project REDESC, the scientific transfer and the implementation of measures, according to the specific case of each partner, proved to be an important component for the improvement of Brownfield revitalization. Especially interesting are the concepts concerning urban planning, environmental protection and financing. Above all, international projects are an efficient way of generating general consciousness on the importance of cautiously handling limited resources and on a sustainable development of urban areas.

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7.7 The U.S.-German Bilateral Working Group: Collaborative Engineering and Scientific Research for a Sustainable Future. Results from Phase 3 (2000-2005) and Beginning Phase 4 (2006-2010).

Maike Hauschild, Dale Medearis, Ann Vega

ABSTRACT

Since 1990, the United States and Germany have worked bilaterally to identify, understand and apply innovative technologies and policies for remediation and sustainable revitalization of contaminated sites in each country. The last sixteen years (= three Phases) have produced remarkable benefits in both countries. Cities in the U.S. such as New York City, Chicago, and Buffalo are applying redevelopment strategies from Germany's Ruhr Valley. Washington DC is applying "green" roof and low-impact development stormwater systems from Stuttgart to redevelop its brownfields. In 2006, cooperation between Germany and the U.S. entered a fourth phase of collaboration. Phase 4 of the partnership will focus on long-term holistic solutions for sustainable revitalization. Regional land-use planning, project management, and site design and landscape, will be studied as integral elements of sustainable revitalization.

Introduction

The U.S.-German Bilateral Working Group (BWG) originated in 1990 in order to share and transfer information, ideas, tools, and techniques regarding environmental research. The U.S. Environmental Protection Agency (USEPA)/Office of Research and Development (ORD) and the German Federal Ministry for Education and Research (BMBF) developed this partnership. Initially, EPA and BMBF worked together in Phase 1 (1990-1995) to evaluate innovative treatment technologies for contaminated sites. Much of this early research cooperation was dedicated to learning about each country's sampling and analytical methods and quality assurance procedures, in addition to learning about each organization's respective mission and policies. From 1990-1995, five innovative treatment technologies were evaluated in the U.S. and five in Germany. U.S. and German sampling and analytical methods were used in both countries. USEPA and the BMBF focused primarily on developing and implementing quality assurance procedures for the sampling and analytical methods and also quality management procedures for the overall technology evaluation. During Phase 2 (1995-2000), the quality assurance/management procedures developed in Phase 1 were evaluated with ten additional technology evaluations (five in each country). In the U.S., Phases 1 and 2 resulted in a refinement of quality assurance/management procedures for technology evaluations. For Germany, Phases 1 and 2 resulted in the German Standard Procedures for the Evaluation of Remedial Technologies (DETAD). Additionally, many of the site remediation technologies were implemented and their evaluation information was transferred to other countries.

In 2000, EPA and BMBF decided to continue their cooperative activities in Phase 3 with a focus on removing obstacles to the revitalization of potentially contaminated sites (e.g., brownfields). During Phase 3, products were developed in each country that will continue to be tested and refined over the next several years. USEPA and BMBF are now beginning Phase 4 of the BWG, which will focus on sustainable land revitalization.

The following sections provide details regarding the evolution and applications of ideas and products developed as part of Phase 3 of the BWG. Additionally, the authors share details of the Phase 4 workplan and the strategies that U.S. and German practitioners will pursue in their efforts to share and apply lessons, technologies, and policies from each country.

Figure 1:
The Bilateral Working Group in Saarbruecken, Germany

Phase 3 (2000-2005)

Organization

While USEPA and BMBF are the lead organizations for the BWG, many other organizations became involved in Phase 3. USEPA's Office of Brownfields Cleanup and Redevelopment (OBCR) joined ORD as a co-lead. ORD was responsible for program management in the U.S. while GSF GmbH was responsible for program management in Germany. The core working group in Germany included: Ferber, Graumann und Partner, Probiotec GmbH, Difu, and Universität Stuttgart. In addition to USEPA's primary contractors, Tetra Tech EM Inc. and Neptune and Company, Inc., USEPA invited the Interstate Technology Regulatory Council (ITRC), a state-led organization, to assist in Phase 3 research as part of the core working group. "Model projects" (projects that were successful in one or more aspects of revitalization) were selected in both countries in order to develop the Phase 3 products. Experts in both countries from federal agencies, state and local governments, universities, developers, and non-governmental organizations (for example, Northeast-Midwest Institute) also participated in product development.

Goals

USEPA and BMBF agreed to the following goals for Phase 3:

- Facilitate equitable land use
- Facilitate faster redevelopment of sites
- Allow greater independence from public money
- Enhance benefits to society

These are similar to OBCR's goals, which are to:

- Protect the Environment: address brownfields to ensure the health and well-being of America's people and environment
- Promote Partnerships: enhance collaboration and communication essential to facilitate brownfields cleanup and reuse
- Strengthen the Marketplace: provide

financial and technical assistance to bolster the private market

- Sustain Reuse: redevelop brownfields to enhance a community's long-term quality of life

Approach

The purpose of Phase 3 was to help revitalization practitioners overcome obstacles to revitalization. The USEPA and BMBF followed a systematic approach for each phase of the BWG. For Phase 3 this included five steps: (1) baseline workshops, (2) feasibility studies, (3) product development, (4) beta testing of products, and finally (5) transferring information, tools, techniques, and approaches through publications, websites, and conference presentations.

Step 1 was to hold baseline workshops in each country to identify potential revitalization obstacles. In 2001, representatives of each revitalization stakeholder group (for example, bankers, developers, lawyers, community representatives, environmental specialists, economists, local governments, etc.) attended a baseline workshop in their home country. A few BWG members attended both baseline workshops. A list of obstacles was developed and then evaluated during the feasibility studies (Step 2).

Following the baseline workshops, USEPA and BMBF developed feasibility study reports to compile the information regarding obstacles collected from the baseline workshop participants and to decide which obstacles would be researched further by the BWG. The intent of the USEPA and BMBF was to provide tools, approaches, and technologies to overcome barriers to revitalization. Over 40 obstacles were identified including: identifying public and private financing options, evaluating and communicating environmental risks, addressing fear of liability (uncertainty), accessing information, communicating effectively with the community, creating a vision, and obtaining political support.

In Step 3, the BWG developed tools to assist revitalization stakeholders in overcoming the obstacles identified and to meet the Phase 3 goals. USEPA and BMBF determined that two tools (one in the U.S. and one in Germany) would be developed, but that the Working Group would use similar approaches and information in order to develop them. For example, USEPA and BMBF used and shared information collected from the open literature and the internet, model projects in each country, national and international conferences, discussions with experts, and joint workshops.

USEPA and BMBF jointly developed and held five workshops in order to collect further information where data gaps were identified. The topics were:

- Economic Tools – Charlotte, North Carolina in November 2002
- Project Management and Marketing – Saarbruecken, Germany in May, 2003
- Environmental Risk Assessment and Communication – Portland, Oregon in October 2003
- Social Acceptance – Leipzig, Germany in June 2004
- Sustainable Reuse – St. Louis, Missouri in September 2004

USEPA compiled the presentations, discussions, and small group exercises on CDs that can be obtained free of charge. Information for ordering copies of CDs, and summaries of each workshop, can be obtained on the BWG website (www.bilateral-wg.org under ongoing activities, workshops).

The information collected from the literature, internet, model projects, conferences, discussions, and joint workshops were incorporated into two comparable tools. In the U.S., Sustainable Management Approaches and Revitalization Tools – electronic (SMARTe) is being developed;

Table 1:
Instructions for Obtaining Workshop CDs

To order Workshop CDs (free)
http://www.epa.gov/nscep/ordering.htm

Workshop	Order Number
Economic Tools	600C03001a
Project Management and Market Strategies	600C05002
Risk Assessment/Communication Tools	600C04099
Social Aspect	600C05009
Sustainable Reuse	625C06001

while in Germany, the START-UP Plan was developed. SMARTe is a web-based decision-support tool that will allow users to evaluate future reuse scenarios in a multi-criteria decision analysis framework. It is intended to be used by a diverse group of stakeholders working together to revitalize a potentially contaminated site. The current version contains information, links, best practices, electronic analysis tools, and presentation/communication assistance. The START-UP Plan is intended to guide users to develop a target-group specific, integrated project and business plan that is tailored to a specific brownfield. It helps to organize available, but often unstructured information, and draws attention to the details necessary for information transfer and communication between involved parties, project planning and securing project funding.

Step 4 of the approach is the testing of SMARTe and the START-UP Plan. Feedback on the products is being obtained through various mechanisms including the SMARTe web-site and demonstrations at workshops, conferences, and on webcasts. Additionally, sites at various stages of redevelopment were selected in 2005-2006 to test the products thoroughly. These "beta test projects" are being asked to use the products and provide direct feedback regarding the usefulness and usability of the tools and information.

As part of Step 5, joint conferences were held in Germany and in the U.S. in order to present summaries of each of the joint workshops and to introduce SMARTe and the START-UP Plan to a large group of stakeholders. The summary conference in Germany was held in Berlin in April 2005. The summary conference in the U.S. was held in Denver, Colorado in November 2005. The conference presentations, question and answer discussions, and the expert panel discussions were strongly tied to the status of SMARTe and the START-UP Plan. Comments received will contribute to the further development of the products. Attendees provided suggestions for the practical application of SMARTe and the START-UP Plan and identified additional research needs. Additionally, webcasts, workshops and conferences are being used to introduce/demonstrate SMARTe and the START-UP Plan to potential users and to raise the awareness of the existence of these tools and their status.

Phase 4 (2005-2010)

Goals (U.S.)

Phase 4 of the BWG will sustain and enhance the work of Phase 3 through the development and application of mutually beneficial technologies, strategies and decision tools to redevelop contaminated lands in both countries. However, Phase 4 will look specifically at the development and application of tools and innovative programs in relation to regional issues affecting redevelopment of contaminated properties.

Like Phase 3, under Phase 4, SMARTe will serve as a primary channel through which the data and innovation from abroad will be channelled and applied. The guiding theme framing the research will be criteria and indicators for sustainable decisions in land management.

Approach

The testing and exchange of information will be organized around six working groups - three in the U.S. and three in Germany. The U.S. working groups have organized their work around high-priority

domestic themes affecting the role of design, project management, and regional land-use planning. Special attention will be given to the transfer of innovative design, project management and land-use from Germany to the U.S. The choice to focus on regional land-use planning emanated from interests in the U.S. to learn more about the broad but important universe of governance, infrastructure, and financing issues and their influence on sustainable redevelopment of contaminated lands. The focus on design emerged from growing appreciation in the U.S. of the influence of design and "green" infrastructure on contaminated land redevelopment. The focus on brownscape design also emerged from needs for tools to sustainably redevelop abandoned mine sites. Through the development of case studies and convening of landscape practitioners, new tools will be developed to assist stakeholders in the evaluation of revitalization alternatives for abandoned mines and other industrial sites. The decision to concentrate on project management emerged out of awareness that regional redevelopment is a long-term and comprehensive effort requiring inclusion of multiple social, economic, and environmental concerns. These concerns require thoughtful integration in order to reduce costs, redundancy and accelerate cleanup.

To further harmonize and strengthen the transfer of innovative technologies, tools, and programs between both countries, four U.S. brownfields practitioners have been selected to work with their German counterparts from the REFINA projects (see REFINA program description below). The four U.S. practitioners offer a unique union of experience with contaminated land redevelopment projects in Germany, regional redevelopment and innovative project management strategies, and proven experience with the transfer and application of innovation. The project practitioners reflect redevelopment efforts in:

- Portland, Oregon (regional governance and urban land-use planning)
- Niagara Falls, New York (shrinking cities and bi-national regional cooperation)
- New York City, New Jersey and Connecticut (regional planning)
- Georgetown, Connecticut ("green" design and private finance).

Goals (Germany)

Bilateral cooperation under Phase 4 in Germany will fall under selected research projects funded under the „Research for the Reduction of Land Consumption and for Sustainable Land Management" (REFINA) program – a program under the Federal Government's National Strategy for Sustainable Development. The aim of the Federal Government's National Strategy for Sustainability is to reduce the consumption of open space for housing and transport to one-third of the present consumption – to 30 hectares/75 acres per day by the year 2020. In order to provide a scientifically reliable basis for decisions and measures, REFINA grants are used in the development and testing of innovative concepts for the reduction of land consumption to achieve a multitude of goals. These goals include the protection of the environment, economic growth, the provision of socially compatible housing, quality of urban building, and mobility. With this program BMBF supports projects for efficient land use which develop and implement in particular utilization concepts for brownfield sites in city centres with a total of about 20 million Euros (more details see REFINA paper in these proceedings). Innovations are, however, generated mostly at the interfaces of different disciplines. Interdisciplinary cooperation is therefore of outstanding importance for changing course in the use of natural resources. Furthermore, the international cooperation of REFINA projects with practitioners from the U.S. will prove the developed concepts and are expected to strike new and unconventional paths

for sustainable land use management in Germany.

Approach

The testing of concepts and exchange of information will be established on running REFINA projects in the focus of "Regional and Local Land Revitalization Planning." Six projects have been selected working on best practice solutions applicable in other cities and regions in Germany. Each project involves researchers but also regional and local planning institutions.

The project REGENA in the Neckar-Alb region constitutes an innovative approach to planning and administering commercial and industrial zones by a voluntary association of communities. The main concept is to have a group of communities (up to 23) negotiate about a set of industrially and commercially zoned areas that are selected, planned and managed as a common pool by all communities together.

Goal of the Saarland Balanced Land-Use project is to take the chance of the Saarland to be the first German state to achieve a zero-growth in built-up land. Saarlands existing demographic perspectives (decrease in population), its location near France and the socio-geographic setting are keys for handling the natural resource „open space" and providing a working infrastructure in the future.

The project NKF-Hanover (Sustainable land use management in the city of Hanover - development of a private sector fund model to create economic incentives to exploit brownfields and reserve building land) aims at creating economic incentives for the re-use of inner-city brownfields or wasteland by developing a private sector fund model. It examines the conditions for realisation of the fund model in the city of Hannover.

The FLAIR project (Land use Management by Innovative Regional Planning) introduces a problem based approach in regional governance and planning and proposes an update of the traditional instrument of so called regional plan in the Region of Southern Upper River Rhine. The region is characterised by a significant disparity between a densely populated, prosperous and growing strip of settlements, industries and traffic infrastructure along the River Rhine and rural areas with smaller settlements within and along the Black Forest. This polarity of a highly concentrated West and rural areas in the East demands differentiated approaches to growth management.

The KOSAR project (Cost-effective reclamation and maintenance of Brownfield sites Models in the UK and Germany) explores specific planning and technical approaches for the use of the reserve status for brownfields. Options of this nature should be developed and implemented by affected regions and municipalities as part of their spatial planning responsibilities. The work is established in Chemnitz, a city with shrinking population.

The conversion of former military sites is addressed by the SINBRA project (Basic strategies for a sustainable reuse of non-competitive areas) using the old military site Krampnitz near Potsdam as representative example for an exemplary restoration of competitiveness of an abandoned site versus competing greenfield developments.

For the focus brownscape design, a project focussing on the development and validation of alternatives for the re-intregration of former industrial sites in urban contexts using the method of a design charette is in preparation. The procedure will be applied at former industrial sites, one in Germany and one in the U.S.

Additionally to bilateral information exchanges and working relations between the counterparts, joint workshops on common interest topics will be the basis for the BWG cooperation.

Conclusions

Germany and the United States share among the strongest and most productive environmental relations. In the 19th century, Gifford Pinchot modelled the U.S. National Forest Service after Germany's resources management programs. Urban zoning codes in New York City were taken and applied from Frankfurt am Main. Germany's Federal Environment Agency (Umweltbundesamt) was modelled after programs taken from the U.S. Environmental protection Agency. Today, through the work of the U.S. – German Bilateral Working Group, the healthy and extraordinarily beneficial transfer and application of lessons between both countries continues. Nowhere is this better demonstrated than in the past work under Phase 3 and the evolving work of Phase 4.

References

Relevant web sites

U.S.-German Bilateral Working Group: www.bilateral-wg.org

REFINA: www.refina-info.de

SMARTe: www.smarte.org

START-UP Plan: www.vegasinfo.de/startup/

7.8 Revitalisation of Brownfields in St. Petersburg – development of a methodology under the aspect of remediation of contaminated sites by the example of the Konjushennaja Square

Daniel Luchterhandt, Thomas Haupt, Irina Tschistowskaja

The project REVVIN "Scientific Approach for the Economic and Socially Compatible Revitalization of Brownfields in St. Petersburg" deals with the sustainable development and the recovery of former industrial sites in the Russian metropolis. The big challenge for the city of St. Petersburg is to transform the historical city centre as well as the industrial belt connected to it.

As, in particular, these areas involve enormous possibilities to sustainably reform the existing structures of the city without utilizing new areas in the outskirts.

The task is to revitalize the historical centre as the world's cultural heritage of UNESCO (4.4 % of the city area) in harmony with the great number of structural and cultural monuments. In the sense of a sustainable development the conversion projects may help strengthening the city as an important location of living, working and supply also in future.

The industrial belt of St. Petersburg consisting of large brownfields is characterized by its vicinity to the centre, a predominantly good infrastructural connection and a few restrictions in respect of preservation of monuments. For the time being, unclear basic conditions as to the property structure, contaminated sites or official competences complicate the mobilization of these valuable areas equally for the city and investors. However, the political will exists – first of all, with emphasis being laid on the historical centre.

On July 11th, 2002 the administration of St. Petersburg passed an ordinance „On the reformation, reprofiling and moving of the industrial companies settled in the city of St. Petersburg to a different place and rehabilitation of vacant territories". The ordinance drafted on the suggestion of the committee for economic development of the city has the purpose to develop the historical centre of St. Petersburg further by moving old industrial sites from the historical centre to locations better suited and by making the areas which become vacant available for a new use.

Figure 1:
The former royal stables (impressions from outside and inside

Figure 2:
The former royal stables (impressions from outside and inside

According to the development plan for the city of St. Petersburg about 980 hectares of the area of former industrial sites should be recultivated until 2010, 1,860 hectares until 2015 and 2,840 hectares until 2025. These areas are used commercially or industrially. The huge amount of brownfields in the city, mostly in the attractive vicinity of the city centre and partially with a good connection to an efficient local public passenger traffic allows to foresee the significance which will be attributed to the resource brownfields for the future area development of St. Petersburg. Nowadays the revitalization of brownfields is still completely at the beginning in St. Petersburg. As irrespective of the fact whether these areas are situated in the attractive historical centre or outside the area protected by UNESCO: the existing problems from preservation of monuments up to contaminated sites confront all actors concerned with unusual challenges for the solution of which experience, money and sometimes also the courage are lacking nowadays.

However, the fact that often a new use of brownfields is worthwhile – from an ecological, town planning, functional and economic aspect – is proved by numerous examples from the regions which have been dealing successfully with this topic already for a long time. The Free and Hanseatic City of Hamburg can look back at a long-standing experience in the field of revitalization of brownfields where innovative methods and technologies for the remediation of contaminated sites have played an important role. Hence, the Committee for nature use, environmental protection and ecological safety of the city of St. Petersburg has asked the Free and Hanseatic City of Hamburg to give support in revitalizing brownfields. This was the reason why the joint project REVVIN was established with the Federal Environmental Agency in Dessau as well as the Hamburg engineering office IGB participating as partners. The project is supported by the Federal Ministry of Education and Research and the Senate Office of the Free and Hanseatic City of Hamburg. During its term of two years the following items should be taken into consideration:

- Transfer of the methodical and technological experiences gathered by the administration of Hamburg in the field of the revitalization of brownfields to the administration of St. Petersburg,
- Preparation of the basis and potential actions as an example of a successful revitalization of the brownfields by pilot projects and
- Development of a guideline for actions to reach an integrated revitalization of areas for the city of St. Petersburg with special regard to the problems of contaminated sites.

Pilot project Konjushennaja Square

On the suggestion of the Committee for nature use, environmental protection and ecological safety of St. Petersburg the location of Konjushennaja Square was selected as a pilot project. The complex near the former stables and the stable square Konjushennaja square belonging to it forms an important junction in the historical city centre from an aspect of architecture and cultural history. It is situated impressively between the world-famous Hermitage Museum, the splendid boulevard Nevskij Prospect and the most significant garden of the city, the Summer Garden. Its typical form is determined by former stables in the north and a closed facade equally needing restoration in the south.

The former royal stables with the Russian-orthodox church above the main entrance to the yard tell an exiting history from three centuries. Its architectural changes from baroque and art nouveau document this impressively. When in 1923 the complex of buildings of the former royal horse administration was handed over to the horse regiment of the militia the fleet of vehicles changed from horses to cars. In the years to follow the complex of buildings was developed into a fleet of vehicles of the Ministry of the Interior with garages and repairshops. In the inner courtyard there was a filling station for internal use. The complex of buildings was given up by the Ministry of the Interior in 2000. Today the private museum of aristocratic culture is in the part of the buildings along the Griboedov Canal. On the square a public filling station was operated between 1932 and 1970, thereupon only its surface installations were pulled down. The square is now used as a car park.

On the northern and eastern sides of the building complex there are the promenades of the river Mojka and Griboedov Canal. Thus, this place is near the way crowded with streams of tourists, yet nevertheless structurally little developed and nearly not used. The main obstacle for a new use is the contamination of soil and groundwater by the filling station. In addition, another danger potential exists by outgassing of easily volatile pollutants: There were the first indications to contamination in 1976 when the buildings were restored. Finally, odour nuisance in the cellar rooms of the eastern part of the building resulted in a restricted use of these rooms in the early ninties.

Altogether there can be stated that the potentials of the location of Konjushennaja Square are at present not used sufficiently which is prevented by the rotten historical building stock and contamination. Here, the possibilities of revitalization seem to be extremely multifarious from the viewpoint of function and urban development. It is a matter of creating good economic, architectural and ecological conditions for a further high-quality development!

Figure 3:
The Konjushennaja Square in the 1920 ties

Objectives

The area Konjushennaja Square combines a huge number of the tasks to be fulfilled in the historical centre. Thus, in developing this place the following questions are to be put:

1. by which uses this location shall be especially characterized, on the one hand , and, on the other hand, which contribution can be made by to the future profile of use to the functional structure of the historical city

2. how may this place be reintegrated into the city structure by remediation of contaminated sites under ecological conditions

3. which planning of free space and architectural development is appropriate to this place and how shall the historical heritage be generally handled.

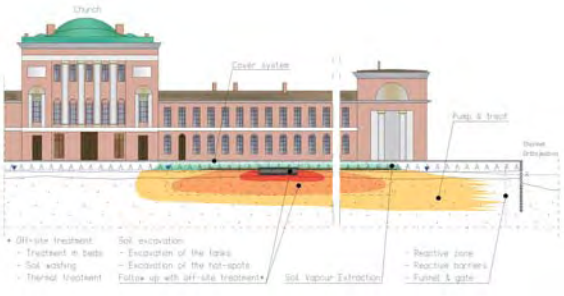

Figure 4: Suggested measures for remediation

The prerequisite to a comprehensive development of the Konjushennaja Square is the remediation of the contamination caused by the former filling station. This must clearly contribute to the ecological improvement of the location integrating thereby its economic possibilities into the development plans including issues of preservation of monuments and urban development in the considerations. The project REVVIN prepared proposals for that from the viewpoint of remediation of contamination which may also have a model character for the conversion of other contaminated locations in St. Petersburg. That is why a remediation investigation was prepared for this location.

Remediation investigation

Field investigations carried out between 2000 and 2004 confirmed the suspicion of contamination in Konjushennaja Square. Their results form the basis for the elaboration of a remedial investigation. After the Russian and German partners researched intensively information on the location of Konjushennaja Square a workshop was held in St. Petersburg in June, 2006 where all information obtained was evaluated and summarised to a model for the site. On basis of this model four remediation variants were worked out which show which temporal (remediation duration) and financial consequences (investment and operating costs) are conncted with the technology applied in each case.

Scenario 1 contains the excavation of the tanks and soil from the main areas of damage where according to the location model the product phase was spread. The area comprises a surface of approx. 3,000 m² reaching up to 5 m below ground level. Because the groundwater reaches approx. 2 m below ground level a groundwater posture is necessary. The groundwater pollution should be eliminated via pump-and-treat. **Scenario 2** envisages the excavation of the tanks and contaminated soil from the immediate surroundings of the tanks. In the further course the light non-aqueous phase liquid has to be removed, the unsaturated soil zone has to be remediated by soil air suction and the contaminated groundwater via pump-and-treat. In **scenario 3** the procedure is analogous to that of scenario 2 a biological in situ treatment of the contaminated soil and groundwater is provided instead of a hydraulic remediation. Deviating from scenario 2 in **scenario 4** a chemical in situ oxidation is envisaged. The scenarios developed provided a decontamination (scenario 1) or partial decontamination (scenarios 2-4). The duration of the remediation varies with the scenarios between approx. one year and more than 20 years. The suggested variants shall be oriented to the future use of the site. In particular, the variants of a partial decontamination must be seen critical against the background of a limited usability, even if they allow to expect an economically lower expenditure.

Altogether, there has become clear that the question for the costs and duration of the remediation measures has to be discussed in connection with the possibilities of the development of the location: Provided that a sensitive use with residential cultivation is planned, only scenario 1 is considered to be a suitable measure because here a complete decontamination is planned. In the case of a commercial use a partial decontamination can be carried out according to scenarios 3 and 4. Because scenario 2 allows to expect a high residual pollution in soil and groundwater it is classified as being partly suitable. Nevertheless: Regardless of the variant chosen the tanks and the soil in immediate surroundings of the tanks have to be excavated.

The dimension of the restoration of Konjushennaja Square as regards its content is confronted with the challenge to approach these questions in a methodically adequate way. Since here the proper difficulty of revitalization of brownfields is hidden: estimation of the remediation expenditure by the authorities to fulfil various targets of remediation objectives and planning harmonizing thereby ecologicall/ hygienic with the socioeconomic, functional requirements and requirements relating to preservation of monuments and urban development. To be able to consider the problems of remediation of contaminated sites in the planning process essential steps were prepared for a remediation investigation by the example of the Hamburg administrative practice. Knowing the administrative structures of St. Petersburg they were modified accordingly to form part of the overall plan of remedial investigation of Konjushennaja Square.

This plan was enriched with drafts made by students of architecture and town planning from St. Petersburg, Hamburg and Brunswick who designed proposals of use and remodelling. Their solutions show that, on the one hand, the place requires that the historical buildings will be carefully handled, thus allowing only insignificant immediate interventions in the structural substance. On the other hand, the work has shown that the space in the existing buildings and the potential surface in the yard offer, to a great extent, new and multifarious possibilities of use. In different ways the architectural solutions show also that in the midst of the historical city centre space exists for an unusual use. Through a self-conscious architecture and user-friendly free space planning this should give a new glare to the location.

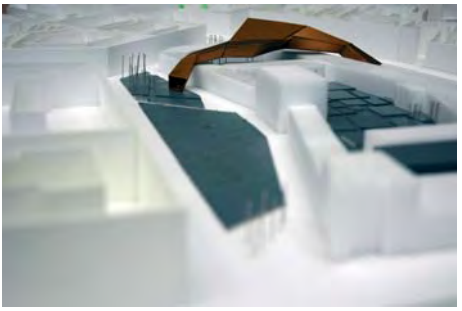

Figure 5:
A student's draft for architectural transformation of the royal stables and the square

First findings from the working process

The following findings may be preliminarily summarised in the present stage of the project:

Technical innovation!

The remediation of numerous contaminated sites in St. Petersburg will be mastered only with the aid of modern equipment. Fortunately, there can be found out that innovative technologies are increasingly applied by Russian enterprises and the know-how is spread increasingly. Nevertheless, need for discussion exists in view of the assessment of the measuring results and the action steps to be derived from them. From the Hamburg view there has become clear that the pollutant limit values prescribed in Russia are very ambitious because they refer exclusively

to an agricultural use. Also knowing the standards of other countries we shall have to consider also within the scope of this project how a further differentiation of the limit values as regards different uses (trade, commerce and living) may look in future in addition to technological innovations.

Comprehensive information!

Development of a location – by the private or public sectors – requires detailed information. Only knowing about the basic conditions of planning allows a comprehensive calculation of a project. This involves the targets of preservation of monument equally as the type and size of contaminated sites. To prevent the inhibitory effect of unclear basic conditions it is worthwhile thinking about the introduction of environmental passports. In this connection the target should be to provide planning security in financial and temporal respect on knowing the remediation costs to be expected in view of the planned uses for all actors concerned. The exchange of information carried out within the scope of this project as well as the systematic, planning-related grouping and processing of the data should be strictly continued.

Technical integration!

According to experience the comprehensive availability of information facilitates the cooperation of the specialised departments because it will be possible to learn from it the different technical interests. In many revitalization projects proof has been furnished that the integrative, interdisciplinary cooperation is essential for a successful development of the project resulting, at the same time, in an acceleration of the implementation of the project. To reuse the huge reserves of areas in St. Petersburg it will be helpful to further strengthen the cooperation which becomes increasingly closer between the individual committees of the city administration.

Open cooperation!

The revitalization of brownfields requires new alliances between different partners. St. Petersburg understood much faster that what developed in cities like Hamburg over a long period. The transformation of the city structures – this, however, does not only refer to the historical city centre – can be mastered only partially by the city itself. That is why the city needs partnerships with investors, operators and users, architects, planners and engineers, associations and initiatives and citizens. An open information policy contributing generally to realistically assessing the possibilities of the area development must be the basis of these partnerships. It is also a prerequisite to making transparent decisions. New forms of the cooperation – as they are also practised within the scope of the REVVIN project by Russian and German partners – as well as innovative methods of the information and participation of the citizens will enrich the wealth of knowledge and experience in each individual case thus certainly promoting a sustainable development of St. Petersburg.

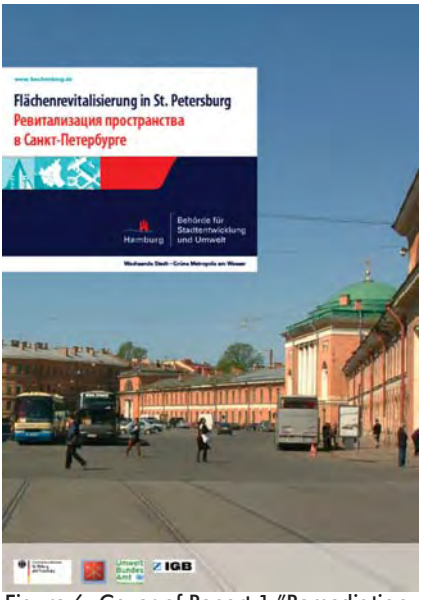

Figure 6: Cover of Report 1 "Remediation of Konjushennaja Square"

7.9 An estimating method for potentially contaminated Brownfield sites: Lessons from Japan

Tetsuo Yasutaka, Hiroyuki Matsuda, Mitsutaku Makino

ABSTRACT

It is important for policy makers to estimate the number of the potential brownfield sites becoming actual brownfield sites, in the near future. In this study, we have made a model to estimate the number of potential brownfield sites, caused by the presence of a contamination, and have estimated the number of the potential brownfield sites in Japan.

In Japan, the number of brownfield sites, which have resulted from contamination, is very few (about 450 sites). However, we estimate that the number of potential brownfield sites is about 80,000 sites. This represents 9% of the total potentially contaminated sites (PCSs) (there are about 900,000 PCSs.). In addition, we estimate that about 450 new brownfield sites will be generated every year. After 30 years, approximately 13,500 brownfield sites will be actualized, as affairs now stand. The Japanese government should establish a new policy that prevents PCSs from becoming brownfield sites.

Introduction

Each country is different in regards to the brownfield problem. In the United States and some European countries, there are a large number of brownfield sites and the number is still growing. An increasing number of brownfield sites causes a bad effect on the regional society, for example shrinking tax revenues, deteriorating security, urban sprawl, decreasing Greenfield, and so on (International City/county Management Association (2001)). Government and local governments in these countries have faced these brownfield problems and have made an effort to resolve them. In other countries, including Japan, there are few recognized brownfield sites and policy makers have yet to grasp the future situation as to whether the brownfield problem will be significant or not in their countries.

In Japan, before 2003, there were no laws to regulate the redevelopment of urban potentially contaminated sites (PCS). Without a proper site investigation, almost all PCSs were redeveloped without investigating soil contamination. However, in February 2003, the Soil Contamination Countermeasures law (SCC law) was established and provided a soil quality standard in order to prevent human health effects from contaminated soil. After 2003, it has been common to investigate a PCS when the PCS will be redeveloped. The reasons behind this change are the establishment of the SCC law, regulations of local governments and increasing voluntary investigation by developers. In this situation, about 10,000 sites have been investigated in the last two years (Japanese Geo-Environmental Protection Center (2006)). However, the total number of the PCSs is still about 900,000 in Japan (Yasutaka, 2007), only about 1% of PCSs have been investigated. For this

reason, there are still very few brownfield sites resulting from contaminated soil in Japan (about 450 sites (Japanese Ministry of Environment, 2006)). Japanese policy makers don't know whether the brownfield problem will be as significant as it is in countries such as North America and Europe.

On the other hand, there are a lot of brownfield sites in North America and Europe which have been wrestling with contaminated soil and the brownfield problem since the 1990s. However, in these countries, policy makers don't know "how many brownfield sites will appear in the near future?"

It is important for policy makers to estimate the number of the potential brownfield sites becoming actual brownfield sites, in the near future, in order to get a grasp on the size of the brownfield problem in each country.

However, limited research exists about the number of existing brownfield sites (Simons (1998), USEPA (2004), U.S. Conference of Mayors (2003)), and there is no research about an estimating method for the number of potential brownfield sites, taking into consideration the mechanism of a PCS becoming a brownfield site.

In this research, we try to make a model to estimate the number of brownfield sites caused by the presence of contamination, and to estimate the number of potential brownfield sites in Japan by applying a Japanese dataset.

Definition of brownfield

Generally speaking, a brownfield site is a previously used site that cannot be redeveloped due to the presence, or potential presence, of environmental contamination. In many cases, a brownfield is defined as the site which was formerly used for industrial or commercial purposes. USEPA (2002) defined brownfield as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant". Also, Alker (2000) stated that the meaning of "brownfield" was recently used in a broader way in Europe and North America.

Intended brownfield in this research

This research employs a narrowly defined brownfield compared to the definition above. We only consider brownfield sites caused by the presence of a contaminant. We call this definition of brownfield as brownfield from here. We don't consider brownfield sites caused by the potential presence of a contaminant.

We think that brownfield sites are caused by the relationship of the cleanup cost of the contaminated soil and land value of the site. We assume that a brownfield needs three conditions. The first condition is that the site is a PCS. The second condition is that the site is contaminated. And the third condition is that the ratio of the cleanup cost of the contaminated soil to the land value exceeds the acceptable burden ratio for the land owner.

If the acceptable burden ratio is equal to 0.1 for the land owner, the land owner will sell their land only when the cleanup cost is less than or equal to 10% of the land value, and when the cleanup cost is more than 10%, the site becomes a brownfield site.

Model and Japanese data

In this study, in order to estimate the number of potential brownfield sites, we have focused our attention on the causes of a PCS becoming a brownfield site. It is clear that not all PCSs will become a brownfield site when they are closed down. As mentioned earlier, there are three necessary conditions for a PCS to become a brownfield site. The first condition is that the site is a PCS. The second is that the PCS has contaminated soil. When this condition is met, the PCS will be a Contaminated Site (CS). The Third

condition is that the ratio of the cleanup cost to the land value is not acceptable for the land owner; as a result the land owner can't sell their site. When all these conditions are met, the CS will be a brownfield site, because the cleanup cost of contamination must be incurred before the site is redeveloped.

In order to estimate the probability of a PCS becoming a brownfield site, we model the mechanism of a PCS becoming a brownfield site. Next we multiply this probability by the number of PCSs, we can estimate the number of the potential brownfield sites. The framework of our model is depicted in Figure 1.

We have applied the model, outlined above, to real Japanese datasets, and can estimate the number of the potential brownfield sites in Japan.

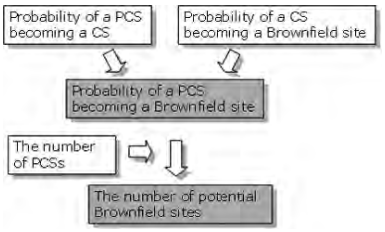

Figure 1 Framework of model

The intended PCS

In this study, we define PCSs as sites used for manufacturing, gas stands and dry cleaners. We don't consider waste sites, military facilities and energy facilities, because about 95% of PCSs include the former type of industries.

We also divide the type of manufacturing factories into two parts. The first type of manufacturing uses little or no chemical substances, such as food manufacturing (we call it manufacturing1). The second type of manufacturing uses and/or used a lot of chemical substances such as automotive manufacturing and petroleum refineries (we call it manufacturing2).

As a result, we consider 4 types of industries as PCSs.

Calculation of the probability of a PCS becoming a brownfield site

We now estimate the probability of a PCS becoming a brownfield site at each site. This probability is calculated using:

Equation 1:

$$BFRisk_{o,w}(z) = h_o \times B_{o,w}(z)$$

where $BFRisk(z)_{o,w}$ is the probability of a PCS becoming a brownfield site when the acceptable burden ratio is equal to z. o represents the type of industry of the PCS. (we consider Manufacturing1, Manufacturing2, gas stand and dry cleaners). w represents the objective region of this analysis(we use prefecture as a unit of the region). ho is the probability that a PCS has contaminated soil at a type of industry o. $BF(z)_{o,w}$ is the probability of a CS becoming a brownfield site at a type of industry o and region w when the acceptable burden ratio is equal to z.

In the next subchapters, we explain the calculation method of ho and $BF(z)_{o,w}$.

Calculation of the probability of a PCS becoming a CS

We calculate the probability that a PCS has contaminated soil by using the following equation:

Equation 2:

$$h_o = \left(\frac{a_o}{b_o} \right)$$

where a_o is the number of contaminated sites (amount of soil?) at the investigated PCSs, b_o is the number of investigated PCSs.

Needless to say, this probability is affected by the definition of contaminated soil. In general, the definition of "contaminated soil" is the condition when soil has contaminants at levels that exceed those considered safe by regulators. The safe levels are different in each country, by the differ-

ence of cleanup criteria.

Dataset of investigation at PCS

The parameter of ao and bo of manufacturing1, manufacturing2 and dry cleaners are collected from the census of Japanese Ministry of Environment (2006). Gas stands datasets are collected from 51 actual investigated sites at PCSs near Tokyo. We directly used gas stand and dry cleaner datasets, but we corrected bo of manufacturing1 and manufacturing2 by the method Yasutaka (2007). Table 1 shows obtained ho at each type of industry.

Table 1: the probability that PCS has contaminated soil every type of industries in Japan.

Type of industries of PCS	h_o
Manufacturing1	11%*
Manufacturing2	67%*
Gas stand	33%
Dry cleaner	61%
* Corrected by method Yasutaka(2007)	

Calculation of probability of a CS becoming a brownfield site

We define that the CS becomes a brownfield site only when the ratio of the cleanup cost to the land value exceeds the acceptable burden ratio for the land owner (see the subchapter "Intended brownfield" in this research).

The probability of a CS becoming a brownfield site is calculated using:

Equation 3:

$$B_{o,w}(z) = prob\left(j_{o,w} > z\right)$$

where j_o,w is PDF, which is the ratio of the cleanup cost of contaminated soil to the land value ($/$). z is the acceptable burden ratio for the land owner at CS ($/$). We use Monte Carlo simulation to calculate the probability of a CS becoming a brownfield site.

The PDF of the ratio of the cleanup cost to land value is described as:

Equation 4:

$$j_{o,w} = \frac{i_o \times Cost}{k_w}$$

where i_o is PDF of the anticipated contaminated soil volume per area at CS (m^3/m^2), Cost is the unit cleanup cost of contaminated soil ($/$m^3$), k_{pw} is PDF of the unit land value at CS ($/m2).

We will explain about the parameter of the equation 3 and 4 in the next subchapters.

Dataset of the unit land value (k_{pw})

The datasets of the unit land value are collected from posted land prices in 2005 (Japanese Ministry of Land Infrastructure and Transport, 2005) at each of the 47 prefectures in Japan. We used 12,567 unit land value datasets of commercial, semi-industrial and industrial areas. The shape of PDF of the unit land value is assumed to be lognormal distributions and datasets are fitted to it. we considered that the geographical location of the industrial type and used datasets of commercial, semi-industrial and industrial areas in the case of Manfacturing1, Manfacturing2 and gas stands. In the case of dry cleaners, we only used datasets from commercial areas. The Geometric Mean (GM) of the unit land value of the commercial, semi-industrial and industrial areas are in the 531$/$m^2$ (Hokkaido Prefecture) to 6,451$/$m^2$ (Tokyo Prefecture) range. In this research, we have used the conversion rate an US dollar: 100 Japanese-yen.

Dataset of the unit cleanup cost (Cost)

We assume that digging up and land filling is selected as the cleanup method. It is the most common method in Japan (about 53%). So, we use the unit cleanup cost of contaminated soil as 400$ per 1m3(constant).

Dataset of acceptable burden ratio (z)

The acceptable burden ratio for the land

owner is one of the most important parameters. However, it is quite different for each situation and it is difficult to determine only one value. For example, for the companies that have come to grips with environmental problems, z may be above 1.0, however for small or poorly-managed companies, z can be below 0.3.

Yasutaka (2007) estimated z value from actual land transactions at 52 sites. This research indicates that all land transactions are a success when z is less than 0.3, But 33% of the land transactions are a failure when z is greater than 0.3. He concluded that 0.3 is a rough indication of z.

So, in this research, we define a PCS becoming a brownfield site when the value of z is 0.3.

PDF of contaminated soil volume per Area (i_o)

It is difficult to estimate the volume of contaminated soil at a CS, because the volume of contaminated soil varies depending on many factors such as site area, chemical substances used there, geology and so on.

In this section, we try to represent the distribution of contaminated soil volume as PDF. In order to represent PDF, we standardize the contaminated soil volume by the site area. We express the volume of contaminated soil per area as the following equation:

Equation 5:

$$x_o = \left(\frac{c_o}{A_o} \right)$$

where x_o is the contaminated soil volume per area at the CS (m^3/m^2), c_o is the contaminated soil volume (m^3), A_o is the site area (m^2).

The datasets co (the volume of contaminated soil (m^3)) and Ao (site area (m^2)) were collected from the actual investigated site data at PCS. These investigations were carried out near Tokyo from 2003 to 2006.

PDF of the volume of contaminated soil per area (io) is obtained by fitting actual contaminated site data of xo, as the following equation. We selected the most fitted form of PDF with actual data.

Equation 6:

$$i_o = fit(dis(x_o))$$

Fitting the distribution of this data to the PDF, we can estimate the shape of PDF io and its parameter. We select the best fitted shape of PDF as lognormal distributions. GM and Geometric Standard derivation (GSD) are estimated so as to minimize the difference between the observed and the predicted volume of contaminated soil per site area. Table 2 shows obtained GM and GSD value of io. We estimated these parameters for the four types of industries. Readers must be careful that i_o is determined by Japanese soil quality criteria.

Table 2 the statistics parameter of i_o every type of industries in Japan.

Type of industries of PCS	GM	GSD	P value	N
Manufacturing1	0.17 m^3/m^2	5.9	0.64	18
Manufacturing2	0.23 m^3/m^2	6.0	0.08	125
Gas stand	0.89 m^3/m^2	3.0	0.35	22
Dry cleaner				

Calculation of the number of potential brownfield sites

Next, we estimate the number of potential brownfield sites. The number of potential brownfield sites at type of industry o and region w is estimated by multiplying the probability of a PCS becoming a brownfield by the number of PCSs. The calculation is done for every type of industry and every prefecture. We express the number of potential brownfield sites through the following equation:

Equation 7:

$$BFN_{o,w}(z) = BFRisk_{o,w}(z) \times PCSN_{o,w}$$

where $BFN_{o,w}(z)$ is the number of the potential brownfield site at type of industry o and region w. $PCN_{o,w}$ is the number of PCS at a category of industry o and region w.

Dataset of the number of PCS

The datasets of the number of PCSs are collected at each prefecture and for each type of industry in Japan. We used the maximum number of PCSs in each industry.

The datasets for Manufacturing1 and Manufacturing2 are collected from a census of Manufacturers, (revised report by industrial site and water and revised report by industry (Japanese Ministry of Economy, Trade and Industry (1983)).The datasets for dry cleaners are collected from census data (Japanese Ministry of Health, Labour and Welfare (1977)). The datasets for gas stands are collected from census data (Japanese Agency of the Natural resources and energy (1999)). Table 3 shows the total number of PCSs at every type of industry.

Table 3 the number of PCS every type of industries in Japan.

Type of industries of PCS	Number of PCSs
Manufacturing1	445,627
Manufacturing2	334,631
Gas stand	59,449
Dry cleaner	58,680
Total	898,387

Table 4 the number of the PCS, CS and Potential brownfield site in Japan.

	PCSs	CSs	PBF*
Number	898,387	331,612	80,030
* PBF means Potential brownfield sites			

Result

The number of the potential brownfield sites in Japan

Table 4 shows the number of PCSs, estimated CS, and potential brownfield sites at z = 0.3. As can be seen, the number of potential brownfield sites is about 80,000 sites (z=0.3) which is about 9% of total PCSs (about 900,000 sites). Estimated contaminated sites are about 330,000 sites which is about 35% of total PCSs.

The regional difference of potential brownfield sites

Aichi prefecture has about 5800 potential brownfield sites, the largest number in Japan. The second largest number is in Osaka prefecture. The prefecture which has the least number of potential brownfield sites is Okinawa (about 400 sites). The number of potential brownfield sites is quite different for each prefecture.

The type of industry difference of potential brownfield sites

The industry type, dry cleaners, has about 14,000 potential brownfield sites, the largest number in Japan. The second largest number is the type of metal manufacture (a part of the manufacturing2). The third largest number is the industry type, gas stand. The number of brownfield sites, which ranked in the top four types of industries, reached 60% of total number.

Discussion

In this study, we made a model which can estimate the number of the potential brownfield sites in an objective region, and estimated the number in Japan.

In Japan, now there are only about 450 brownfield sites primarily resulting from contaminated soil (Japanese Ministry of Environment (2006)). However, we estimate that the number of the potential brownfield sites is about 80,000 sites and this is 9% of total PCSs (see table 3).

In the last 2 years, about 5,000 PCSs were investigated in Japan (Japanese Geo-Environmental Protection Center (2006)). We expect this same number of sites will be investigated. By using this number and the average probability of a PCS becoming a brownfield in Japan (9%, see table 3), about 450 new brownfield sites will be generated every year. After 30 years, there will be 13,500 brownfield sites in Japan. More over, we haven't considered brownfield sites caused by the potential presence of contamination. And if we take that it into account, the number of brownfield sites will increase further.

In addition, there is a great regional difference in the number of brownfield sites. Increasing the number of brownfield sites causes a bad effect on regional society, for example shrinking tax revenues, deteriorating security, urban sprawl, decreasing Greenfield, and so on (International City/county Management Association,2001). So Aichi and Osaka prefecture must be careful about the brownfield Problem.

We developed the generalized model to estimate the number of the brownfield sites caused by the presence of contaminants. This model can be applied to other countries, not only Japan. It is useful for policy makers who want to figure out of the size of the brownfield problem.

However, the parameter values of this model may change in each country, because of the difference of the soil quality standards, the unit land value, the number of the PCSs and unit cleanup cost.

Readers must be careful that the definition of brownfield in this research covers only brownfield sites caused by the presence of contamination. We haven't considered brownfield sites caused by the potential presence of a contamination. So, there is a possibility that the estimated number may be underestimated.

Conclusion

In Japan, the brownfield problem is not such a big problem at present, and there are a small number of brownfield sites. However the brownfield problem will become a bigger problem in the near future. We think that the Japanese government should establish a new policy that prevents PCSs becoming brownfield sites.

We developed the generalized model to estimate the number of the brownfield sites caused by the presence of a contaminant. This model can be applied to other countries. It is useful for policy makers who want to figure out the size of the brownfield problem.

However, it is important to note that this estimated number of brownfield sites includes only brownfield sites caused by the presence of contamination and doesn't include brownfield sites caused by the potential presence of contamination. So, there is a possibility that the number may be underestimated.

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7.10 Reactivation of Derelict Industrial Sites in Romania a Project of GTZ for Economic and Employment Promotion

Gabi Schock, Doris Hirschberger

ABSTRACT

For the moment Romania is a very interesting market for investors. The gtz, an international cooperation enterprise for sustainable development in cooperation with the Romanian Ministry for European Integration, intend to promote the reactivation of derelict industrial sites to. direct the settling of Investors to all regions of the country and to keep them away from Greenfields.

The planning process in Eastern-Europe is actually not comprehensive to the well regulated Western European system. Starting civil works on Greenfields, is time-uncalculable.

"Reactivation of Derelict Industrial Sites in Romania" has the scope to develop a methodology how this sites benefit of a shorter location- and planning process time, than Greenfields.

The first step was designing a database of derelict industrial sites. For potential investors, it offers the opportunity to get quickly informations. Following there will be, on the example of pilot projects, a training how to use the methodology.

Introduction

The socio-economic effect, caused by the drastic structural change in the German federal state North Rhine-Westphalia and East Germany has been researched the last years. So there is a high experience and designed solutions which can be transferred to other countries with structural change problems.

Considering this it is not astonishing that the Romanian Ministry for European Integration asked the German Federal Ministry for Economic Cooperation and Development for consultancy and project support

The project "Reactivation of Derelict Industrial Sites in Romania" was developed. The project is supported by the gtz (cooperation enterprise for sustainable development) and accomplished by Düsseldorfer Consult GmbH, Stadtwerke Düsseldorf AG and INGENIUS Berlin.

Most profitable European market

The (former) low prices for real estate and the absence of modern office space caused, in the bigger cities in Romania, a high building structure activity. Even for South-East Europe it is a high level.

Recently the investment by developers of building projects is very high. Numerous land speculators increase the prices for land in Bucarest and some big cities. Mainly the speed of the increase was astonishing. Real estates in the congested urban area are very expensive in comparison with other upcoming markets in South-East-Europe. This is not only in Bucarest, its also in other big cities in regions of Transilvania and the Banat. (specially in the centre and around Timisoara) In certain areas the prices grow up to 80 % per year. Some market observer, have the

opinion that there will be a consolidation-phase, at least for certain real estates.

Does it mean that investment in Romanian real estates, are no more profitable? Far from it: According to a recent published study by PriceWaterhouseCoopers, the Romanian real estate market is the most lucrative from 20 researched states in Europe. The requirement, specially in infrastructure projects, is immense. The same applies for modern apartments. The standard of living and the income of young Romanians increase. Furthermore there are big differences between prices within the country. The metropolitan areas still have a high investment potential, that is confirmed by the unbowed investments. But investors become choosey.

„Greenfields" are preferred

In the last months there was a phenomenon respectively a shifting of interests to be seen: facing the high differences between prices of (not only) top locations in bigger cities and sites located at the periphery or outside congested areas and considering the high need to catch up of this areas they gain interest.

Often foreign investors choose greenfields. They don't know the tasks and risks concerning to that. Many of this areas are (not already) declared as to be used for construction. Instead of that they are declared for agriculture use. The areas should be used for industry and commerce projects often and the investors speculate that the traffic routs which have to be build will develop the area. This approach needs preparing work by the investor, for example the passing of additional administrative procedures before the project can be started.

First step would be to assign the area into the "within an city" range. This can take from some weeks to some month (related on the quality of contacts to the administration and on the importance of the planned project for the city). If this is arranged the area normally has to change its declaration from agriculture use to building land. This also takes from some weeks to some month. Afterwards finally the apply for the construction permit can be made.

In this context it must be pointed out, that, as result of the restitution of agricultural land, which was expropriate during the communist era, the agricultural land is spitted. Mostly each owner has only a small area of agricultural land. To posses a adequate area to build up a industrial or commercial park, they have to conclude several contracts of purchase with different persons.

Another risk beneath the risk not to be declared as "within an city" range and as building land is that the taxes for this change of declaration can be up to 400 percent (!) of the purchase price of the land.

Vantages of derelict industrial sites

Because of cost and time reasons the focus of investors is put on derelict industrial and military sites.

The problems caused by undamped use of greenfields make the reactivation of derelict sits an essential component of an economic and sustainable city development.

Many derelict sites dispose of a good equipment, have an exposed position and good infrastructure conditions – this means a large potential for development.

For the regional development the reactivation of a derelict site means not only a revaluation of the site but also of its periphery. If the reactivation is made soon after the end of the former use, movement of labour can be avoided and social stability can be abided. Regional decision-making units, which have this in mind will assist reactivation projects as much as possible.

Data base eliminates information deficit

One of the main reasons why investors use Greenfilds most of the time is the lack of information about available derelict industrial sites and about how to handle them. With a data base including all relevant information about a site, especially about existing pollution, the risks will be calculable for investors. By this way the location-specific advantages are available.

Therefore the assembling of a national wide data base about derelict industrial sites was the first step of project work. The database includes all military and industrial sites which are not in use any more in Romania. The specific data for the sites should answer the main questions for investment decisions: use in the past, kind of pollution, available infrastructure and so on.

With the assembly of important site information a potential investor/user gets the needed help for site selection. Time is an important factor for investors – with the data base he gets the possibility to save time. Currently greenfield areas have to be rededicated in Romania most of the time - this can take about two years. With the bundling of information in the data base investors have the possibility to search with different focus and to compare different sites.

At the moment the needed data is collected from municipalities, Regional Development Agencies, the Ministry of Environment and the Privatisation Agency – work should be finished by end of 2007. The continuous update of the data base will be assured. More information about the project can be found under www.reactivation.de

The data base includes information from the following sections:

- Cover page with basic information about the area and with pictures and maps in different scales
- Estate concerning information
- Information about valuation and financing
- Information about the business location
- Construction law concerning framework
- Preparation of land for building

Pilot projects

Goal of the project is the development of a methodology for the reactivation of derelict industrial sites which considers the situation in Romania. This methodology will be shown and tested by pilot projects. All results will build a manual which will be available for the public to include a large range of people into future projects.

Project organisation

Reactivation of derelict industrial sites is an interdisciplinary task for planers, engineers, project developers, licensing authorities, construction and waste management companies and many other actors. It has to balance the interests of all of them, especially the interest of the local authorities, the owner of the site, investors, users and people living close to the site. That is the reason because many projects fail on problems with a clear attribution of authority and many not defined interfaces and responsibilities.

The above mentioned fact makes a goal-oriented organisation of the project necessary. The project steering group will integrate their competences cross section oriented into the project group and the project advisory board. It will cover the topics planning, technique and controlling. The project steering group structures all partitions of the project and arranges competences and decision making power.

Successful reactivation of derelict indus-

trial sites projects base on an effective working together of a multitude of experts and licensing authorities. This makes a goal-oriented organisation of the steering group working together with the project group necessary.

In a close collaboration between the consultants and the project group the different modules survey, development of a concept for a second use, analysing the relevant law, conditioning of the site will be trained and implemented by the project group. Workshops will be used for a working together evaluation.

The following tasks will be managed by the project group after close consulting with the steering group:

- clarification of all questions related with the ownership of the site
- preparation and realisation of the derelict site specific survey
- coordination of planning and licensing procedure
- adjustment and optimising between the planned new use and the conditioning of the site necessary for that
- preparation of the economic efficiency / cost control system
- analyse of the legal framework
- organisation of public relation and marketing
- early coordination of the project with the municipality and the planning sovereighnity
- contract management
- cost controlling for the project
- financial management of the subsidies

The project group should integrate the knowledge of the responsible communal planning and construction agencies, the environmental agencies, the monument protection agency and the relevant regional and national institutions of Romania.

The project advisory board should be build of regional multipliers from the environment of the pilot project – from public administration and from private companies – for example the mayor, potential future users, directly involved people. They should be able to include their interests. In one workshop there should be fixed leading goals and developed using ideas. The advisory board should assist the licensing procedures and the appliance for subsidies. It should also support the public relation work.

The support organisation of the project will include responsible people for regional planning and reactivation of derelict industrial sites – that increases the competence of the team in a technical, methodical and organisational way.

Development and implementation of a monitoring and evaluation system

Within the project a manual with checklists for the reactivation of derelict industrial sites into the economic cycle will be developed and implemented. Main focus will be the aptitude for the use in the practice.

The structure of the manual will be oriented on the characteristic fields of action of the reactivation of derelict industrial sites. It can be used as a decision guidance for the preparation of detailed planning and technical supply for future projects.

The questions of the checklists cover the contend of the main fields of project development for reactivation of derelict industrial sites.

The use of the checklist offers the opportunity to sensitise the project group for the complex structure of a reactivation project. They get an topic overlapping overview about the project and about the project goals.

The checklist includes enquires for the early assessment of project risks to allow to arrange further research and actions as early as possible. Checklist based discussion between project group and steering group detect deficits in planning and implementation.

This found out deficits can be cleared by the steering group with specific recommended courses of action. By this way the steering group submits concrete proposals for an optimised and effective way of reactivation of derelict industrial sites for the manual.

They correspond to legal or technical instruments, forms of organisation, policy and procedures and are guidelines for the best use of this instruments in further projects.

The manual will deliver assistance for the following topics:

- organisation of the project executing organisation
- evaluation of economic efficiency / cost control
- valuation procedures
- guidance how to apply for structural funds money and other subsidies
- develop a concept for a second use
- public relations and marketing
- organisational help for authorities
- estate planning law steering tools
- licensing procedures
- contracts for all involved in the project
- political framework

Fixing of sub-goals and controlling

To decrease project risks it is necessary to implement the project steps and tasks into phases. In the first step the project organisation will be established. During the first workshop the project goals are described by the project group. Only if project control, project group and the gtz have an agreement about the goals, the operations and different activities of the project can be well coordinated.

The adequate instrument for fixing the goals and controlling the project is an action plan. This plan will be developed in the planning phase by all participants in the first workshop. It includes the structuring of the project into goals, sub projects, phases, activities, deadlines, costs and so on and is the base of the project management with all planning, steering and coordination tasks. It allows to analyse deviations and risks and to plan the time table of the project. For the project controlling it is the base for the cost analyse and planning. Results and effects can be controlled and evaluated.

All this shows the importance of a detailed project organisation and steering which should be based of the knowledge and experiences of the project coordinator. The Stadtwerke Düsseldorf AG are glad to include their know-how and experiences in project steering and implementation into the planed reactivation of derelict industrial sites.

Communication

Main goal of the project is to enable a large group of actors to work successful in the field of reactivation of derelict industrial sites. For this a adequate communication is of high importance:

- Intensive exchange during interactive workshops
- Internet based documentation of the project progress and of the project results
- English/German/Romanian speaking contact person

Conclusions

The methodology worked out in this project offers the chance for a sustainable regional development in Romania – the results can be transferred to other countries affected by structural changes.

7.11 Can We Really Compare Brownfield Regulation and Redevelopment in the United States and European Union?

Philip Catney, Kristen Yount, John Henneberry, Peter Meyer

Abstract

This paper is intended as a cautionary tale about international policy comparisons. We argue that comparing and transferring lessons from 'aggregate' political units, such as the European Union, are impossible in the face of its internal complexity. Instead, we undertake a focused comparative analysis of brownfield policies in Massachusetts and England. Our analysis examines the institutional and political contexts shaping the different approaches to brownfield redevelopment. Commonalities and differences in program development, policy implementation and environmental and economic outcomes in the two settings are highlighted. We point to methodological and practical difficulties in transferring lessons from one case to the other. However, the comparative case findings are used to derive principles to guide efforts to control for variation in efforts to replicate or translate program experiences from one national – or locally specific – setting to another.

'Politics is the art of looking for trouble, finding it, misdiagnosing it and then misapplying the wrong remedies.' -- Groucho Marx

Introduction

This paper asks a deceptively simple question. At first glance, the answer is an obvious 'Yes:' Brownfield regulation and approaches to the regeneration of previously developed (and potentially contaminated) property in the United states (US) and the European Union (EU) has previously been compared (Meyer, Williams and Yount, 1995). The real issue is the character and method of the comparison – and the quality of the lessons learned from the exercise.

There is much experience of policy transfer upon which to draw; whether this has occurred within the member states of the EU, between extant EU members and accession states in the past decade (see Bache & Jordan, 2006). A key benefit of lesson-drawing is that the costs of developing innovative programmes are incurred by the first nation. Other countries can learn lessons from the experience of this nation without having to go through a process of trial and error, although there are often costs involved with the process of adaptation (Rose, 2001: 4). These attempts at learning through imitation, often as a short-cut to the development of programs, have met with decidedly mixed results. The history of US-UK economic development policy transfer serves as an object lesson of failure, which might have been heeded by brownfield policy makers (Meyer, 1991). In the past, British policy makers tended to look to the United States when seeking to draw lessons (See for example, Wolman, 1992; Jacobs, 1992; Hambleton 1994; Parkinson, 1999; Dolowitz et al., 2000; Shutt, 2000). There were a number of reasons for this. The two countries share certain characteristics of urban problems (for example, a history of racial tensions) in which the US has had more experience.

Ideology often underpins such exercises in policy emulation. For example, during the 1980s the Thatcher government preferred to consider experience in the US, which embraced privatism and Reaganomics, rather than that of the western European mixed economies (Law, 1988: 446). The two most important policy imports from the US into British urban policy have been the Urban Development Grants (from the Urban Development Action Grants in the US) and the concept of public-private partnerships (Law, 1988: 446).

However, the appropriateness of such policy transfers has been questioned. Higgins et al (1983: 9) argued that 'the lessons learned from America were the wrong ones, or they were misunderstood or misinterpreted. In any event, the assumption that American perspectives could simply be transplanted unmodified, to the British situation soon met with difficulties.' The factors that contributed to inner city blight in the US (for example, under-funded services) were different from the problems of the UK urban areas (Higgins et al 1983: 9). Furthermore, the answer for one city (assuming that the US had the right policy in the first place) differs from that for another, especially if it is in another country on a different continent. Similar problems constantly arise in integrating the policies and practices of different member states in the efforts to forge common European standards for environmental policy (see Jordan & Liefferink, 2004).

In this paper, we emphasize the potential fallacies of the implied comparison, although we do derive some lessons about the processes of comparative analysis and policy transfer. These may reduce error in the widespread practice of attempting to learn from the experiences of others. We begin with a discussion of 'the brownfield problem' and of how it manifests itself in the US and the EU. Next, we briefly consider the legal and political diversity within the two aggregates of states, the European Union and its 27 members and the 50 states in the United States. We then turn to an exercise in more focused comparison, examining Massachusetts in the US and England in the EU. Finally, we identify some factors for which allowance must be made in any effort at policy emulation or learning between intra- or international locations.

'The Brownfield Problem'

The problem begins with the different ways in which the term 'brownfield' is defined in American and European English. The US passed a massive bill intended to promote the remediation of contaminated sites that posed serious threats to human health and the environment well before the issue was prominent on European political agendas. The original 1980 law, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; also known as Superfund for the pool of monies it collected) was promulgated in response to the discovery that a complex of new homes (in Love Canal, New York) had been built over a toxic waste site and neither the developer nor the occupants knew of the environmental problems present. CERCLA imposed such draconian liability for past contamination that urban redevelopment was virtually choked off, with any previously developed site suffering from the stigma of possible pollution problems.

Efforts to moderate the impact of the Act and to provide some liability protection for redevelopers of urban sites led to a need to distinguish "Superfund sites" from other properties that did not require massive federal government resources to remediate. The label adopted for the non-Superfund sites was the term previously used for any urban developed site, 'brownfield' (Yount, 2003).Thus the US usage came to diverge from that of the rest of the English speaking world, which retained the original meaning.

But the definitional difference hides a deeper divergence between the original objectives of the policy that we are comparing. The US focus from the outset was

on sites, individual parcels or groups of parcels of land that held or generated contamination. The concerns of the member states of the European Union were more broadly focused on urban decay and the need to strengthen urban settings as living and working environments. In those states that do have an 'urban policy' (see below), concerns about broader redevelopment goals, not necessarily pollution, influenced the way that many EU states approached the problem of contaminated land. Such sites were identified in the course of a broader effort at regeneration of areas – neighborhoods, districts and whole urban communities. A further difference can be seen in the extent to which land reuse is deemed to be a policy imperative. The US has a massive perceived surplus of developable land. Abandonment of developed sites is not seen as causing the loss of alternative land uses, since non-urban sites are commonly assumed to be idle and nonproductive in US policy discourse. In the older, more densely settled, European environments, especially those of the smaller EU member states, this land abundance is inconceivable. For example, in the Netherlands the precise geographical nature of a country dictated the policy adopted. Because the water table is relatively closer to the surface than in most other EU states, it tended to be more cautious than countries such as the UK. Our comparisons thus may have started with different uses of the term 'brownfields,' but they really broaden to consider different conceptions of the role of urban space and degrees of concern for adaptive reuse of previously developed sites in different settings.

For purpose of clarity below, we shall use the term 'brownfield' in the European sense of developed land. If we refer to property that is either known to have or suspected of having significant environmental issues due to past pollution, we shall describe that as 'contaminated land,' despite possible uncertainty about actual contamination conditions.

Diversity within the Aggregates – Can they be compared?

The diversity within both the US and EU bedevils any effort at comparison on the broad level of the unions. In the EU, variation in laws and traditions of state control over land are compounded by accession history and past and current eligibility for special resources such as Structural Funds. This confounds generalization (see Bache and Jordan, 2006). Unlike the EU, the US has immutable national law that shapes the context for brownfield redevelopment, imposing a single national liability scheme and standard for liability relief. However, the fifty states have their own constitutions and assign different land ownership rights, some virtually blocking land use controls while others rely heavily on them. This renders generalization similarly meaningless in the US.

The extent to which member states of the EU have developed urban policy varies considerably. Atkinson (2000: 1043) observed that some countries 'have developed an "explicit" urban policy (for example, the UK, France, the Netherlands); others have largely chosen to tackle urban problems through the adaptation of mainstream programmes at the local level (for example, Denmark) whilst some countries (for example, Spain, Portugal and Italy) have done neither.' The last two rounds of enlargement of the EU have added considerably to this final category. The development of urban policies within EU states has been somewhat ad hoc and contingent on national policies and priorities. Yet, while to speak of an explicit 'EU urban policy' is to err because, as Tofarides (2003) observed, there is no explicit treaty basis for the development of a EU urban policy - there is a clear urban dimension to its wide regeneration, its own local government organization. In some states, for example, the County is the basic unit of local government, with only a subset of the land area incorporated into regional policy and broader policies of spatial de-

velopment[1] (see Atkinson, 2000, 2001).

The range of diversity within the US states is not readily appreciated, even by its own citizens. Each has its own constitution that dictates state government structure and, more important for area-Municipalities. In others, there is no land that is not part of some "minor civil division," in addition to being in a county. The prospect for area-wide projects is far more limited in the latter than in the former where a broad swath of land may be in a single jurisdiction. Moreover, both state and county sizes vary tremendously, and all counties have general government, including land use planning, powers, as do municipalities. (For example, Kentucky, with a land area of 40,409.02 square miles has 125 counties, Arizona, with 113,998.30 square miles, has only 15.) These physical and organization differences are compounded by variation in economic history in intensity of settlement and population density, and in current economic vitality.

Basic land use control powers such as zoning are limited in some states with respect to the capacity to force less intense future uses as spatial patterns change. Many states restrict local powers to use any zoning capacities without super-majority votes in their favor. In some states, any zoning change that results in a loss of hypothetical sale value to property cannot be implemented without payment of compensation to the land owner for the presumed economic loss. Compulsory purchase powers are severely constrained. Some jurisdictions are permitted to take only for public facilities (roads, schools, other public buildings), while others are given broader rein to acquire land for parks, nature preserves or even redevelopment projects.

With respect to contaminated land programs, states vary in the relief from federal liability that they offer current and future land owners, in the requirements for mitigation of environmental conditions that they impose, and in the extent to which they require that local efforts inform surrounding property owners and occupants about findings on environmental conditions, let alone involve then in decisions about remedial responses. Similarly, there are vast differences in state requirements about the degree to which existing property owners and residents or local businesses are provided access to regeneration planning activities, or given any power in decisions on public support for such efforts.

In developing this paper, we undertook a comparative analysis to extract lessons about both the methodological problems involved and about the evolution of regeneration policies themselves. As the observations above indicate, we discovered that comparison of the United States and the European Union was simply not possible. We could not control for variation within the two aggregates, and we could not compare two 'representative' states from the EU and US – such representative entities simply do not exist and the variation is too great.

A Specific Comparison and its Findings: Massachusetts vis-à-vis England

Instead, we have undertaken a more specific comparison. This is an examination of two political units with comparable industrial histories that actively pursue brownfield regeneration. From the United States, we take Massachusetts, and for the European Union, we will take England, not the UK as a whole, while acknowledging that other British nations operate similarly, albeit with different laws.

Table 1 shows some simple comparisons with respect to physical characteristics and industrial history that appear to be germane to the analysis. These comparisons are crude, but indicative. We cannot in the scope of this brief note address the differences in the definitions of 'urban,' 'vacant,' or even 'area' that may exist in the statistical series of Massachusetts

1 For example in the period 2000-2006, the classification 'urban areas in difficulty' were included in the Objective 2 program (Atkinson, 2001: 398).

and England, but these and similar problems compound the complexity of any comparative analysis[2]. Different historical mixes of industrial activities and their rise and decline in economic importance has shaped perceptions of, and policy responses to, land contamination across US states. While England is considerably larger than Massachusetts in terms of total land area, its population density is roughly similar. Massachusetts is more 'urban' than England, where the land use planning system has powers to impose greenbelt protections to prevent significant development outside existing urban areas. Furthermore, available data suggest that the mining and manufacturing sectors in Massachusetts continued to grow long after these sectors had declined in England. However, recent figures suggest a rough parity once again.

In terms of housing demand, however, England would appear to have a stronger market. The percentage of housing units that are vacant is significantly lower than in Massachusetts while the percentage of house building taking place is significantly higher. Moreover, the market prices that housing units command is far greater in the UK as a whole than in the USA: Comparing median home prices in the UK (which includes lower cost Scotland, Wales and Northern Ireland to those in the US, we find that the former is £172,065 while the latter (for owner occupied units, not rentals) is $167,500, or less than half as much, given an exchange rate of roughly $2 to £1. Focusing more narrowly, the median home price for the Outer South East is £200,235, while that for owner occupied homes in Massachusetts is $361,500, much closer, but still lower, especially when allowance is made for the lower values recorded for rental housing units.)

We can briefly examine the institutional and political contexts shaping the different laws, agencies and mix of nongovernmental organizations involved in urban regeneration efforts in Massachusetts and England. Some are described in text form

2 In fact, the term 'area' can refer either to land alone or to land plus surface water area included within a political jurisdiction, and Massachusetts' TOTAL area, including waterways, is 27,340 square kilometers, implying a lower population density measure.

Table 1: Selected Statistics – Massachusetts and England

Characteristic	**Massachusetts**	**England**
Total Land Area (Square Kilometers)	20,305	(Approx) 130,000
Density (population/Km2)	313	383
19th Century Industrialization	Clothing, textiles, shoes, machine tools, shipbuilding	Clothing, textiles, shoes, mining, machine tools, steel, shipbuilding
% of Labor Force in Mining +/or Manufacturing, 1850	38%	40.9% (Britain)
% of Labor Force in Mining +/or Manufacturing, 1950	44%	28% (1900 –Britain)
% of Labor Force in Mining +/or Manufacturing, 2000 or later	11% (2002)	14% (Britain)
% of Pop. in urban areas, 2000	91%	71.5%
% of all housing units vacant, 2000	6.8%	3.2% (England and Wales)
% of housing units built 1995-2000	4.3%	4%

Sources include:
http://cteconomy.uconn.edu/TCE_Individual_Articles/Fall_1998/New_England_Check-up.pdf
http://www.commcorp.org/researchandevaluation/documents/ResearchBrief1-08.pdf
http://www.census.gov [for all the year 2000 specific data]
http://www.britannica.com/ebi/article-200227
http://www.statistics.gov.uk/articles/labour_market_trends/century_labour_market_change_mar2003.pdf

Table 2: The Planning Context: Policy Style, Governance Characteristics and Property Ownership

Characteristic	Massachusetts	England
Overall Style	Strong emphasis on primacy of the market	Mixed economy model: state supporting market
Planning Policy Style	Weak, flexible, permissive, easily manipulated	Strong, structured, restrictive, interventionist
Civil service protections provided to local authority staff	Strong state-standard civil service protection not provided to most local government personnel	Strong protection provided for national civil service; (somewhat less) strong protection provided for local government officers.
The size of local jurisdictions and their planning capacities	Of 351 municipalities, 69 had over 25,000 population, 5 over 100,000; professional planning staff not required by law, custom	Nearly 400 local authorities in England and some 10,000 parish and town councils (latter mainly in rural areas and holding very limited powers). Planning is a statutory responsibility of local authorities, so professional planning staff are employed by all of them.
The extent of free-holding of the land under constructed premises.	Lease holding is rare, existing for limited business premises, never for owner-occupied housing.	While free-holding is the dominant land tenure, development on long ground leases is not uncommon
The extent of public participation and notice requirements for land use and development decisions	Open processes and records but limited notice requirements; appeals rights limited to those who can prove an economic (financial) interest in decisions	Open processes and records but limited notice requirements; appeals rights limited to those who have a legal interest in the affected property.
Record review protocols required for planning decisions, building permissions, and property transfers	Property title, easement and lien searches required by lenders, not by law; no public requirements	Property title, easement and lien searches required by lenders, not by law; no public requirements

in Table 2; their significance in shaping policy is described below the table.

A fundamental difference between Massachusetts and England relates to policy style. Differences between planning policy styles mirror those between general styles. Furthermore, these differences have very significant implications for the approaches taken to dealing with contaminated land in the two areas. They revolve around the relation between the planning system, the land market and the mechanisms for dealing with brownfield land. Put briefly, the stronger, more restrictive planning framework in England reduces land supply and raises land values. The latter are, consequently, much higher than in Massachusetts - and are normally sufficient to cover the costs of de-contamination. Indeed, in England, they are the main financial mechanism for achieving clean-up. Government grants, tax-breaks and so on are only available for the minority of sites that cannot be dealt with via the development process.

That is, in England, there are ‚structural' arrangements that back up area approaches – but are not to be conflated with them. Those arrangements result in constraints on land uses and act to drive up land values. The higher land values then work at site level, so they apply even where a location is not covered by a specific area-based-initiative. In contrast, in Massachusetts, lower prevailing land values offer fewer opportunities for funding site treatment through development – and a more substantial and diverse array of financial incentives must be offered to achieve that end.

To the extent that there are limited civil service job protections in place and the municipalities making land use decisions are small in size, local officials, both elected and appointed, are exceptionally susceptible to influence from local property interests. This is especially so in the US context, in which running for electoral office requires raising funds from private donors. Political jurisdiction size, and thus planning capacity, shape land use change controls, if any, and the ability to monitor site preparations for reuse of contami-

nated land. Separate free-holders compound legal problems, but also can lead to leaseholders or occupants taking less responsibility for any environmental problems (Jayne and Syms 2003). Public participation and notice provide controls over the influence that business interests wield over decisions and may protect neighborhoods that would be changed or displaced by proposed regeneration projects. The legally-required record reviews are key elements in long term stewardship for regeneration efforts on contaminated lands that are not fully remediated and have pollutants remaining on site but presumably isolated from doing harm.

Focusing on similarities and differences in contexts for policy formation and implementation, however, may cloud the picture when there is a fundamental difference in orientation. The first difference noted in Table 2, the extent of primacy given to private market processes and outcomes, leads to two different views of the role to be played by any intervention by the state. The primacy given the market in the US leads to interventions oriented toward site-specific redevelopment, since developers' investments are made in specific sites. By contrast, the mixed economy model shaping policy in the UK leads England toward a concern for area-based regeneration.

As Table 3 demonstrates, the objectives, methods and evaluative criteria for interventions appropriate to the two approaches differ so much that common metrics for measurement of 'success' may be impossible to derive. If interventions cannot be measured on some common metrics, then they cannot be directly compared. Not only is the answer to the topic question in the title of this paper 'no,' but we would even have to conclude that comparing Massachusetts to England is impossible.

Table 3:
Objectives, Methods and Evaluative Criteria for Site-Specific and Area-Based Interventions

Objectives	**Mass.: Site-Specific Redevelopment**	**England: Area-Based Regeneration**
General Environmental Objectives	reduce human health risks, liabilities	better regional environmental conditions plus risk reduction
General Economic Objectives	increase tax base; job creation on-site	improve area-wide attractiveness to capital
General Community Objectives	remove eyesores, lower abandonment; possibly generate or raise home-ownership	reduce community disamenities and generate specific economic improvements
Actual Consultation on Local Community Objectives	minimal; as required by law with respect to community notice and consultation	potentially extensive; (although development agency may listen but not act on local concerns)
Methods		
Lead Actor(s)	private developers	Private actors, public agencies and quasi-public authorities
Public Site Assembly, Preparation	minimal - minimum necessary to get private action	potentially extensive - to achieve area change
Public Support Mechanism(s)	direct financial subsidies; site rezoning	Complementary investments, planning changes
Evaluative criteria		
Time Horizon	short - completion of onsite redevelopment	long - allowing time for expected spillover effects
Policy Efficacy	Property sales for cleanup and reuse; impact on site values and tax revenues	new capital flows into area; increase in area economic activity, incomes, and property values
Policy Efficiency	minimizing public sector expenditure	maximum leverage on public funds
Policy Effectiveness	rate at which private landowners successfully market their contaminated sites for reuse	increase in area economic activity, household incomes; reduction in area disamenities

Source: Adapted from Meyer, 2001.

This finding then poses the question if any learning is possible in comparisons across international, national – or even regional or cultural lines. We conclude with a brief discussion of that issue.

When is a 'Success' Replicable? Principles for Policy Emulation and Translation

Policy analysts often stress the historical and contextual barriers that exist to the effective transfer of a program from one national context to another. Our argument here and the findings in Table 3 should make clear that it is essential to control for variation in both context and intent in any efforts to replicate or translate program experiences from one national – or locally specific – setting to another. At one level, political and cultural values can differ markedly between countries. This can affect how a particular programme operates in different social contexts. For example, introducing a risk-based approach into a risk-averse culture may produce substantial resistance to the new programme from implementers and the wider public.

Rose (2001: 4) further distinguishes between contingent obstacles that are variable (for example, the economic priorities of the government of the day) or long-term (for example, federal as against unitary institutions). More specifically, the incorporation of a lesson or a new program will often be affected by the matrix of established programmes in any functional or geographical area. These programmes will generally be interdependent creating the problem that the 'innovative value will depend on its being different from what went before, yet its success will depend on how well it integrates with other programmes to which it must relate in the same field.' (Rose, 2005: 107)

To overcome these contextual barriers, Rose (2001; 2005) advocates the development of models that abstract the generic elements of a programme that are necessary for it to be successfully exported. Abstraction provides a means of focusing on the essentials of a successful programme. It demands identifying the cause-and-effect relationships critical to making the programme succeed. Rose (2005: 72) suggested a number of features that a model must identify of a programme, including the relevant laws and regulations; the organizational structure and relevant types of personnel (for example, specialists such as engineers or generalists such as accountants); how the programme is financed; and the characteristics of the intended programme outputs and outcomes.

From the preceding discussion it may be reasonable to conclude that the differences in objectives, land markets and structures of government preclude applying lessons into the two areas successfully. However, such an exercise can serve a useful function in exposing the underlying principles and discourses which structure the way that the two systems function, and the consequences these have for the site-level practice of brownfield development.

Our attempts to compare the US with the EU were confounded by the sheer complexity of the systems operating within the two 'aggregates'. Furthermore, it was difficult to identify two 'typical' or 'representative' cases within the two aggregates. Instead, we undertook a more specific comparison between two political units with comparable industrial histories which have specific brownfield policies. Our comparative analysis of the Massachusetts and England led us to draw certain lessons about both the methodological problems involved and about the evolution of regeneration policies themselves.

We identified two of the fundamental policy differences between the two areas: general policy style and planning policy styles. The differences in these had implications for the approaches taken for regulating contaminated land. In particular, the relation between the planning system,

the land market and the mechanisms for dealing with brownfield land were clearly important. The planning system in England played a crucial role in raising land values by restricting the amount of greenfield land available for development. This reduced size of decontamination costs as a proportion of total development costs making redevelopment of severely contaminated sites more viable. The planning system also played a key role in ensuring that an 'area approach' to brownfield development was adopted so that broader social issues were addressed. In contrast, in Massachusetts, a weak planning system and a national policy style which emphasizes the freedom of market actors contributed to lower land values and offered fewer opportunities for funding site treatment through development. Brownfield development thus became contingent upon an array of government incentives which focused on purely the development of the site.

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7.12 Brownfield remediation and redevelopment: valuing the costs and the benefits

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ABSTRACT:

This paper discusses costs and benefits of remediation plans for contaminated site. We argue that CBA may help non only the decision process at the public level but it may give a contribution to participatory processes which are becoming more and more necessary to implement vast and expensive remediation programs, with the advantage of public and private stakeholders. An attempt to value these benefits has been recently developed for sites on the Italian national Priority List.

Introduction

The European Union states that "Protecting the environment is essential for the quality of life of current and future generations,"… and that "Public participation is a central element in the common procedures applying across the EU for assessing the environmental impact of public sector policies and programs and of investment projects.' The European legislation is guided by the "polluter pays" principle, implying both that the polluter may be required to invest in equipment and processes that reach environmental standards and, as in the new Directive on Environmental Liability, that responsibility for the cost of cleanup is placed on those parties who have contributed to creating the contamination problem. This system should both prevent future contamination problems and provide financing for any needed remediation. In practice, the application of such principle in recent years has show faults: the burden of environmental liability and the costs of complying with the environmental legislation have discouraged large scale and diffused cleanups. Of course the negative effects of the slow pace at which sites are remediated is a matter of public concern and calls for new initiatives and policies, many of which will require the joint effort of private and public agencies.

This situation is common to most countries sharing the same problem of a wide diffusion of brownfields[1] and an insufficient rate of cleanups. Clearly, the high cost of cleanup is a serious source of concern, and initiatives that rely on private and voluntary cleanup—to be encouraged by offering inducements to firms, real estate

1 The Small Business Liability Relief and Brownfields Revitalization Act defines brownfields as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (USEPA L. N. 107-118, 2002).

developers and investors—are currently under consideration at many locales, where they would supplement the more traditional, enforcement-based programs (Turvani et al., 2006).

Little is known, however, about whether the public is in favor of these forms of incentives and public support. In this paper we argued that careful analyses of the social and economic benefits which can accrue to the population are not only necessary for an improved public decision making but could be very useful to help public participation and to obtain population support[2]. The remainder of the paper is organized as follows. In Section 2 we introduce the issue of contaminated sites in terms of diffusion of the problems, and extent of the cleaning up costs. In Section 3 we analyze the main costs and benefits of the remediation and requalification contaminated sites problems. Section 4 presents the conclusions.

Sites remediation and its costs

Cleaning up contaminated sites is currently considered one of the environmental policy priorities in many countries.[3] Remediation of contaminated sites is attractive because it reduces risks to human health and ecological systems, and brings a host of potential social and economic benefits. Whether enforcement-based (as it typical of most recent contaminated site programs) or relying on collaboration between private entities, such as developers and investors, residents, and governments (as in many recent "brownfield" initiatives), addressing the problem of contaminated sites is judged to be an important component of sustainable urban regeneration and has important implications in terms of economic development and quality of life for residents and workers.

The new European legislation, which will enter into force by April 30th 2007, (2004/35/CE), draws heavily on the experience of the contaminated sites statute in place in the United States—Superfund, which was established 25 years ago—while trying to avoid some of its drawbacks. The European legislation is based on the "polluter pays" principle and on assigning responsibility for the cost of cleanup on those parties who have contributed to creating the contaminated site in the first place. However, to avoid creating some of the undesirable effects of liability, the new EU legislation will apply only to damage caused after the Directive enters into force in the Member States.[4] It will not, therefore, be retroactive.

Individual countries within the European Union have, of course, passed their own statutes to address contaminated sites. These statutes follow the general principles spelled out in the European Directive.

The Directive on Environmental Liability points out that land damage is any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms. Because contaminated areas are often found in derelict urban areas with previous industrial development, environmental remediation must be combined with redevelopment policies to meet sustainability goals in medium and large cities in Europe, where the majority of Europe's population resides. Contaminated sites are particularly numerous in cities with a strong industrial tradition and

2 Recently, the Department of Planning – University IUAV of Venice – has administered a conjoint choice questionnaire to a sample of the Italian population. The results of the survey suggest that the preference of the Italian public is broadly in agreement with this approach: The Italians want to prevent contaminated sites in the first place, detect promptly any contamination problems, that they want the government to address directly sites for which the responsible parties cannot be found or cannot pay for cleanup. Finally, Italians also support economic incentives for private initiatives

3 See Eurobarometer (2005) for statistics about the importance of environmental quality and concern about various types of pollution to the citizens of the European Union.

4 Experience from the United States, where contaminated site legislation based on this approach has been in place for 25 years, shows that the burden of environmental liability and the costs of complying with the environmental legislation have discouraged cleanup and reuse of previously used urban areas. The Superfund program has been criticized by the public for the slow pace of cleanup and by firms for its retroactive feature. It is also widely alleged that the Superfund liability has discouraged the reuse of sites that are feared to have contaminated problems (the so-called "brownfields").

in most case, closed industrial plants have been found to be contaminated sites. Various factors have contributed to the formation of abandoned contaminated sites include a demographic shift away from the city to the suburbs and urban fringe areas, expanded transportation networks, and the regional redistribution and diffusion of commercial and productive activities with the consequent reorganization of people's life and consumption habits (Pellow,1998). More than 300,000 potentially contaminated sites have been identified in Western Europe and the estimated number for the whole of Europe is much larger (Van Camp et al. 2004). The diffusion of contaminate site in the territory, and the extent of contamination in soil, in water, and groundwater constitute a menace to population health and to the ecosystem, and legal rules work both to limit this menace in the future and to address ongoing problems by identifying responsible parties and at least in part solving the problem of finding adequate financial resources for cleanups.

The burden for private and public finance is heavy: official reports (EEA, 2000) estimate that the total cleanup costs for the countries that have provided data are about 115 billion euros at current price, or 490 euros per capita. Each of the EU countries that provided data since 1997 relies on the polluter-pays-principle. However, in practices administrations realize that liable parties are difficult to be identified or have not sufficient resources to cover the necessary cleanup costs, implying that they frequently contribute either by providing a public budget to finance major cleanups, or establishing special funds, such as waste taxes collection, loan systems or voluntary agreements with industry.

Contaminated sites remediation is an expensive priority for the governments but the removal of pollution substances from the soil can contribute to numerous benefits, among them the improvement of environmental quality and the reduction of risks posed to human health. Environmental remediation policies should be evaluated within the framework of benefits-cost analysis to enhance the efficacy and efficiency of their implementation. In addition, it is essential that communities understand the potential beneficial impacts of site remediation and sustain the implementation of public policies for environmental cleanup of contaminated sites.

Identifying the cost and benefits: a social perspective

Can we infer the total value of the comprehensive effects of cleaning up contaminated sites by examining only the effects on the value/price of land? To quantify the loss of value due to contamination, the easiest approach is to subtract the cost of cleanup from the value of uncontaminated property (Tonin,2006). Indeed empirical research has focused principally on this kind of assessment. But does this difference also capture the benefits of cleanup? The perceived and true impacts of contaminated sites remediation recognized by the majority of researchers include economic impacts (e.g., new job opportunities), fiscal impacts (property tax revenue) and property value impacts (changes in the value of adjacent existing local properties). All of these effects are potentially important and need to be valued to address in a proper way the decision of whether to remediate or not a specific contaminated site, both for the private and public stakeholders.

A comprehensive cost and benefit analysis of any brownfields intervention site must take into account various factors that can have positive or negative impacts on the value of the property, on the communities involved by the cleanup project of the site, and on the natural environment. The costs of brownfields redevelopment and remediation can be divided in two broad categories: direct costs, linked to the remediation process itself, and indirect costs, i.e. costs related to the effective management and implementation of brownfields redevelopment and remedia-

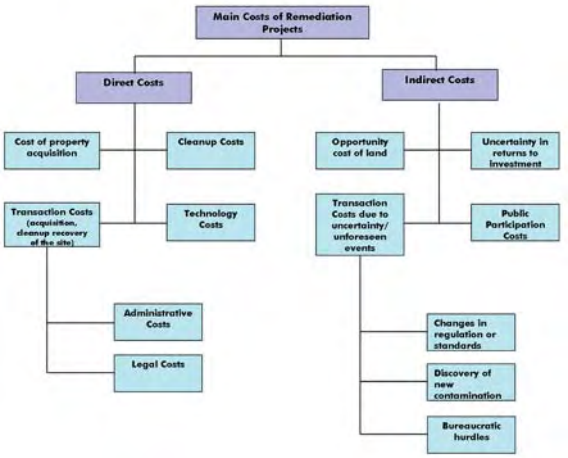

Figure 1: Main costs of remediation projects

tion processes (see Fig. 1).

The direct costs depend on the type and severity of contamination (extent, mobility of contaminants), the characteristics of the site itself (location and historical conditions of the area), the choice of the best available cleanup technology, and finally the administrative and legal costs relative to the acquisition, cleaning and recovery of contaminated sites.

Indirect costs are, for example, those due to the delay in using the land because the remediation process is slow, and those related to the uncertainty and the higher transaction cost of the project. Brownfield redevelopment projects pose higher levels of uncertainty to decision-makers than would occur with any other property investments, and especially greenfields. The higher risks refer to the site assessments needed to determine the type and extent of the pollutants, remediation planning, the execution of remediation plans, and the environmental damage liability claims associated with the past pollution of a site. Any one of these factors imply higher transaction costs that involve an array of measurement, information, bargaining, and contracting costs other than those associated with acquisition of unpolluted land. Other costs incurred due to contamination are related to the difficulties in accessing the necessary funding for development project. Thus, although many contaminated sites have the potential for becoming profitable business ventures that generate new activities and new employment opportunities, public investment is often needed to catalyze private funds. This is because the clean up interventions are very expensive, and financial capital is hard to find, and there is considerable delay between the initial investment and the time in which the site can be productively used again. According to OECD (2000) the role of the public sector in these projects is to design the cleanup strategy, to pinpoint the appropriate areas for development, to initiate the remediation process, to provide funding and to encourage the participation of the private sector.

Economists recommend that the costs should be compared with the benefits of the project. Thus, focusing now on the positive side of the brownfields remediation and redevelopment process, the main benefits can be grouped into three broad categories: environmental benefits, social benefits and economic benefits (see Fig. 2).

The environmental benefits include the reduction of development pressure on greenfields sites, protection of public health and safety, protection of groundwater resources, protection and recycling of soil resources, restoration of former landscapes and, establishment of new areas deemed to have ecological value. Restoring natural areas may also entail "non-use benefits", such as the option to conserve a natural resource to use it in the future, and the enjoyment of knowing that natural resources are preserved for future generations.

The social benefits include, among others, the renewal of urban cores, the improvement of the quality of life, the elimination

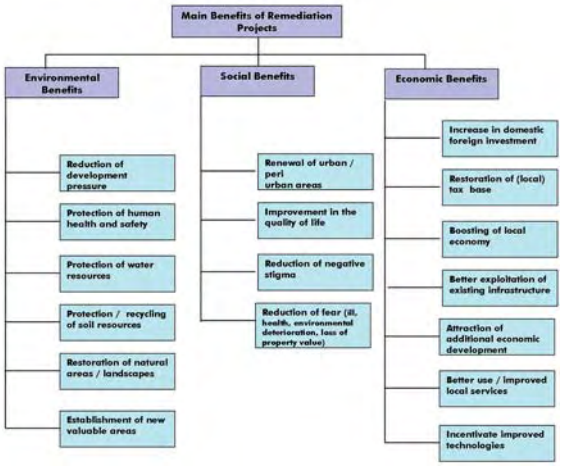

Figure 2: Main benefits of remediation project

or reduction of the negative social stigmas associated with the affected communities by revitalizing them, the reduction of the fear of ill health, environmental deterioration, and loss of property values in these communities. Stigma affect the value of real property an appropriate methodology were developed to measure its influence on the price of real estate market. Another important positive effect included in this benefit category is the reduction of fear and anxiety related to the perceived health risks. There are many potential economic benefits of remediation and redevelopment of brownfields sites. For example, domestic and foreign investment can be attracted to the restoration of the tax base of government, especially at the local level; increasing employment (number of short-term and long-term jobs), thus boosting the local economy; increasing the utilization of, and reinvestment in, existing municipal services; the development of remediation/decontamination technology; and the exploitation of existing infrastructure systems. By returning these facilities to productive use, cities can reacquire their economic and social vitality and be the catalyst for additional economic development. In many situations, estimating the above benefits is often hampered by severe data limitation.

The economic value of goods or services is generally captured by market price or, more precisely, by how much people are willing to pay to obtain them. There are however a number of goods, such as environmental quality, human health, and risk, which are not traded, and for which markets are absent. Economists have resorted to a variety of techniques to place a value on these goods, which are generally termed non-market goods.[5]

A research program funded by CORILA (Consortium for Coordination of Research Activities concerning the Venice Lagoon System) and realized at the Department of Planning, University IUAV of Venice, is ongoing to assess the monetary value of these non-market goods and social benefits. Applying the conjoint choice analysis we have conducted two different surveys. One study has shown the relative importance and efficiency of different market-based mechanisms and other incentives intended to promote the environmental remediation and reuse of "brownfields" (Alberini et al. 2005). The second one monetize the economic benefits of reducing the risk of dying for people exposed to hazardous substance in contaminated sites and people risk perception in general. Specifically, we have surveyed a sample of the Italian population administering a questionnaire using the conjoint choice analysis to find out individuals' preferences for public policies of cleaning up contaminated sites, and to infer the value of people' willingness to pay for a reduction in the risk of mortality (Alberini et al. 2006).

5 For valuing non-market goods two approaches are used: revealed preference and stated preference methods. With revealed preference techniques, preferences for non-market goods and income are revealed indirectly when individuals purchase other market goods that are in some way related to the non market goods (i.e. Travel Cost and the Hedonic Price Methods). By contrast, stated preference techniques ask people to report their willingness to pay in the course of an interview (Contingent Valuation) or infer preferences by asking people to choose among hypothetical alternatives (Conjoint Choice).

Conclusions

Contaminated sites remediation is one of the urgent policies for local and national governments. But, site remediation is an expensive operation and it needs the support of public and private sectors, together with the consensus of communities. Communicating the beneficial effects of cleaning up contaminated sites to the public may be decisive for the effectiveness and success of a remediation policy. In this paper we have attempted to analyze the main costs and benefits of contaminated sites remediation project. Many benefits of site remediation are generally defined as non-market goods (i.e. risk reduction, improvement of human health, etc.) and their monetary valuation requires non traditional economic techniques such as conjoint choice analysis. An example of such applications is provided by a recent research of Department of Planning in collaboration of CORILA. In this research, applying a conjoint choice experiments, we have elicited people's preference for different public policies of remediation which reduce human health risk.

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7.13 Brownfield Indicators in the Czech Republic

Jan Votoček

ABSTRACT

Czechs have taken part in a number of research projects and have redeveloped many sites. The awareness has risen but still remains within these basically pilot and pioneer activities.

In 2006 the Ministry of Regional Development funded a project ‚Revitalization of brownfields for public administration'. Local data was collected and extrapolated to regional scale. In certain districts the distribution of origins turn out to be quite unexpected (61 % agricultural, 21 % residential, 10% infrastructure, 6 % educational and only 1 % industrial and 1% military) and overwhelming 50 % of sites were smaller than half a hectare.

The project introduced new brownfield indicators which enable comparison for cities and district based on commonly available data and cheap basic site surwey. The indicators compare what % of city is a brownfield, how much new construction land would be spared if development went on brownfields and how long would it take to solve brownfields considering annual construction activity.

Brownfields in Czekia

In Czekia there is a handful of conferences and workshops takes place annually and number of universities, institution and ministries have been participating in international projects and networks. Czech knowledge and experience has improved significantly.

The project called ‚Integrated Strategy for Brownfields Redevelopment in the Czech Republic[1] from the year 2004 delivered the very first report on sizes and origins of brownfields for the whole country. Many other network projects have contributed with assessments, databases, education packages (for example LEPOB [2]. What has happened in the Czech Republic in recent years describes the paper Towards Integrated Regeneration Policies and Brownfield Advocacy in the Czech Republic [3] included in these proceedings.

There are many realized brownfield's reuse project, which applied changes in use, mixed use. Considering Cabernet ‚ABC model' [4] redeveloped ‚A' and ‚B' sites count certainly in hundreds. For example Buergermeistrova gives examples of 16 redeveloped ‚B' sites. [5]. But the projects remain single, separate and do not get main streamed or ‚copied'. Thus the impact is too little to change common attitude in the country.

The Author spent weeks travelling through the regions with camera and laptop collecting the data from owners and public sector representatives. Despite all the events the author has experienced that majority of stakeholders in regions is uneducated and does not have any tools to work with. Many even have never heard the term ‚brownfield'. But all of them know the sites by heart.

Definition of brownfields in Czekia

There are more definitions and terms fro Brownfields used in Czekia. The author of the paper uses the CABERNET [4] Definition.

Figure 1: Map The Czech Republic [6]

Need for Indicators

There is a relatively good experience with benchmarking processes among Czech cities. Association of towns and villages and a network of 75 Healthy cities of the Czech Republic compares public transport availability, distances to schools, parks etc. Many cities have joined international benchmarking comparing quality of life, etc. However there is a complete lack of comparable indicators for brownfields and use of urban space. A figure of annual green land consumption is not available at all.

The author took part in basic site identification of two projects. The projects took different approaches to brownfields but both extrapolated the results to regional/ national scale.

National investment approach

The project called ‚Integrated Strategy for Brownfields Redevelopment in the Czech Republic from the year 2004 delivered the very first data on scale and nature of brownfields in Czekia. It is not an objective of the paper to talk about the results of this project, but it is an important background information for the project described below, which introduced regional approach to the country.

The national project continued in 2006, when the sites larger than 2ha and with a minimum of 500 m sq. were selected from the database for more detailed investigation. The goal of this phase was mainly to choose suitable sites, especially along motorways, national roads and interesting locations for later parts of the project including pilot redevelopment projects. Unexpected redevelopment rate of sites was found in some places. In Ustí nad Labem, the capital of North Bohemia Region, out of 22 brownfield sites found in 2004, 9 were not brownfields any more, which gives 41% redevelopment rate figure [7].

State agency Czechinvest [8] (by the Ministry of Finance) plays a major role in this project. It's objective is to attract foreign investment into the country and so the project is focused on rather large, post-industrial sites, which is excellent as long as it is not the only representation of brownfields issue in the country.

Figure 2: Vacant Shipyard [9]

Regional approach

The Ministry of Regional development funded a project called ‚Revitalization of brownfields for public administration' in 2006 [10]. The main goal was to enhance the abilities of local governments to redevelop brownfields.

Three extended administrative districts from Central Bohemian region were chosen for their different background and location. Pilot skims showed size, origin and nature of brownfields there and gave an outlook on the whole region.

Each site was described by two A4 pages:

- Basic description, GIS location
- Technical conditions, environmental risk category
- Origin
- Ownerships, location, interest,
- Pictures, map

The project focused on sites of 0.5 hectare and larger. The author collected all the sites in his district for research and advocacy reasons.

The Indicators

The research of the Ministry of Regional Development introduced the following indicators. They are counted from two sets of data. The first is based on physical research in particular administrative district. The second set consists of data from the master plan and land use plans (open documents) and from the sum of areas in building permits:

a. Sum of areas of brownfield sites
b. Total build up area
c. Prospective development area
d. Annual construction need

The indicators:

1. Area of brownfield sites to total urban (build up) area
2. Area of brownfield sites to prospective development areas
3. Area of brownfield sites to annual construction need

Comments:

(1.) The first indicator shows how much of a city is a brownfield in %. 2-3 % is a natural rate unless it represents the sites in the heart of town. It can be compared to unemployment for example [11]. But if it comes to 8 or 10% or more, it means a problem. Unofficial figure for Ostrava talks about 30-35%.

(2.) The second indicator shows how much of new construction could be directed onto brownfields saving green land outside of town.

(3.) The third indicator shows how many years it would take to solve the brownfields problem. It describes a model situation when all development would happen on brownfields and no new brownfield sites appeared. There are town in Czekia which would need 50 or even 100 years.

Figure 3: Vacant Sanatorium [9]

The Indicators on the Internet

A very good result of project of the Ministry of Regional Development is a www.brownfieldsinfo.cz web page. The database is accessible with password only. The password is given on inquiry by DHV Brno [12]. This part of the web page is meant to be a comparative tool for towns and local administrative bodies to find out what is the nature of their sites and what chances do their brownfields and towns have comparing to the sites in other administrative districts.

The web is not very user friendly but is simple enough to be easy after some hours of work. The representatives of local government can fill in a general questionaire (demographic, economic and geographical features) and than type in the information about their sites one by one. The first 200 sites were filled by professionals.

Than the web page gives graphical and chart representation of the sites and their ‚chances for redevelopment' compared to other sites already filled in by other municipalities.

If required data (b,c,d) was given, the indicators are also shown. It is mainly a case of towns because collecting urban development data from the whole administrative district could mean visiting more offices and as it is not required by law (not even while preparing new master or local development plan) nobody has time for that.

The web site of the first project www.regenerace.org provides a database also accessed on password, which can be obtained from the Czechinvest. The comparative tool is not there but the indicators can be calculated with a bit of work using the database and urban data available for example on the server of Czech statistical office.

Regional approach results

Indicators in the districts of

Figure 4: District of Votice [6]

Votice and Kladno

An extended administrative district of Votice was chosen as one of formerly mentioned pilot districts. It has mainly agricultural character and quite an interesting location. It is 70 km from Prague, 35 km from the Czech main motorway from Prague to Brno. The national road from Prague to Austria (Linz, Salzburg) goes through the town of Votice itself as well as the mail electric railway to the south. Planed motorway to Austria cuts through the district.

Identical survey was conducted in the district of Kladno. The town badly bears the heavy-industrial history and suffers from massive commuting to Prague which is only 20km away.

Table 1: Town of Votice and Kladno [6]

Feature	Votice	Kladno
Inhabitants	4462	71132
Demographic trends 1991 -2001	Stagnating	Decreasing
Unemployment [%]	2	10
Population Density	53	152

The town hall of Votice provided for the information needed for the indicators. The results are good. Only 3,6% of the town is a brownfield, and the there is no brownfield in the very centre of the town. But the whole quarter of green land could be saved if the planners would consider redevelopment and not only new development. If all the investment went on Brownfields, they would be used up within 5 years, which is in comparison to other towns a very short time.

The results in the town of Kladno are much less optimistic, even if most of the sites are 5km from the motorway and 16km from the biggest Czech Airport. Due to inability of local public administration to prepare and implement a long term strategy (most of the sites are still coloured as industry by the master plan for example) and complicated ownerships of the sites, there has been no real progress and what is worse, some small parts are being redeveloped separately and may hinder throughout redevelopment of the area in the future.

Table 2:
Source data for Indicators and results [10]
Town of Votice and Kladno [6]

Feature	Votice	Kladno
Sum of areas of brownfields [ha]	5	153
Total build up area [ha]	139	1720
Prospective development area[ha]	18	60
Annual construction need [ha]	1	6
Area of brownfield sites to total build up area [%]	3,6	8,9
Area of brownfield sites to prospective development areas [%]	27.8	255
Area of brownfield sites to annual construction need [years]	5	25,5

Feature	Value
Inhabitants	11.908
Area	28.878 ha
Willages	15
Demographic trends 1991 -2001	- 5 %
Unemployment	4,7 %
Working outside the district	44 %
Economic subjects	2.700
Of that selfemployed	2.398
Of that with no employees	1921
Of that with more than 20 employees]	31

Table 3: District of Votice [12]

Results in the district of Votice

The term Brownfields is unknown to most of the local representatives, but all of them are very well aware of the sites, their history and promises form different owners. There is a complete lack of education and literature in Czech language.

The owners are either open, because they want to sell their property, formal if they think they have to take part in Ministry's project or averse out of different reasons. Local governments would very much like the sites to get redeveloped.

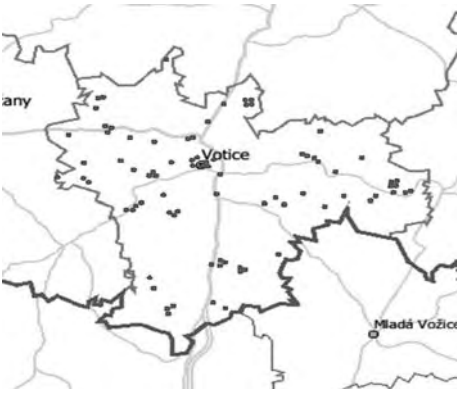

Figure 5:
Distribution in the district of Votice [9]

Histogram of sizes

It was very interesting not to follow the original 0,5 ha limit and register all the sites (football field has about 0,7 ha). The results are striking. Half of the sites are smaller than 0.5 a hectare. If the sites represent buildings on the main street or at the square of a village or a small town they have a significant impact on the whole social environment and surely should be taken into account.

Origin of sites

Most of the sites in the district of Votice come from Agriculture. These are of two kinds. Either they are traditional square farmyards, which are in the centres of villages - well integrated into the urban tissue or they are former communistic giant agricultural cooperatives standing rather separately in the near of the villages. Brownfields appear despite the fact that farmers are very active in the district. More than 80% of the agricultural real estate is in use by SME.

The second most frequent groups, including acre sites, are the residential brownfields. Sometimes it is 4-5 houses in the centre of a village or a town which have fractional change to get redeveloped but still have a major impact on the environment. The average area of these sites is only 0,1 ha. In many villages a half of houses is used for weekends and as summerhouses.

The third group consists of various public infrastructure from shops to pubs and also of castles and office buildings. These sites have more or less zero chance to get redeveloped.

The forth group represents vacant schools in public ownerships, respectively those which were not turned to offices or flats.

Minimum of industrial brownfields is caused by the nature of the district and by good location and state of industrial sites which enabled their redevelopment as factories and ware houses.

Development potential of sites

The research also assessed the sites in following categories:

- Clear ownership
- Chances for quick and trouble-free redevelopment
- Attractive location
- Political interest in regeneration
- Interested persons or companies

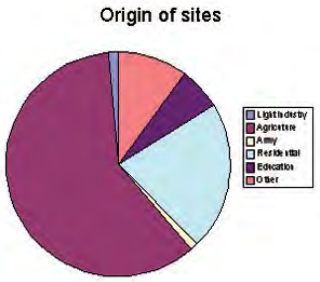

Figure 6: Origin of sites [9]

The following chart describes all the sites (regardless their origin) in the district of Votice (excluding the town itself):

Conclusions of the research in Votice

The sites which have become most troubling brownfields are hardly accessible or completely over dimensioned. Certain number of sites was bought for speculative reasons.

Chances for redevelopment of many of the sites are slim, because they are badly located and are densely built over not leaving much free space for new buildings.

The research does not register successfully redeveloped sites. It would be most

beneficial to repeat the research in pilot district after 3 or 5 years to see the trends and changes.

0,5 hectare limit is understandable but in such a scale of researching misses too many sites or types of sites which do have a significant impact on their surroundings.

The comparativeness of the data also depends on good job description to the researchers, because sometimes it comes to a subjective view which decides it the site is a brownfield or not.

All stakeholders lack education.

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7.14 Impact of Government Initiated Urban Land Management among Informal Labor Forces: A Case Analysis from South Asian Mega city

Saleh Ahmed

ABSTRACT

South Asia is now one of the most vibrant economic regions in the World and simultaneously agglomeration of a lot of urban poor. A major part of the working force is informal. But, they are also playing a substantial role in the region's economic vibrancy. As an usual process in South Asia, spatial agglomeration of informal labor force is an important factor for the urban economy in Bangladesh. A lot of poor rural-urban migrants in Bangladesh are basically absorbed by informal settlements in its mega-city, Dhaka. These absorbed migrants are the basic source of labors for the informal sector of the city. Here the informal sector plays very frequently as the basis and basic input for the formal economic sector also. Most of these people and their agglomerations are scattered around various business districts. Biased with traditional pro-western city development initiatives, the Government of Bangladesh has initiated new urban land management strategies to eradicate slum settlements, which is basically formed by labor forces of informal sector. These poor people have usually no way without going far from their working regions. In this paper, we would try to analyze the social and economical impacts of these slum evictions as part of so called government initiated urban land management. We would also analyze, whether this initiative from the government is a „poverty generation process" or a step up for better livelihoods. We would also try to come up with some proposals for socially acceptable urban land management.

Background

The World is getting more urbanised even more than human's anticipation. Urban populations grew faster than the capacity of cities to support them. Rapid growth of cities in connection with economic crises, currency devaluations and shortening national expenditures is as it were „a safe prescription for the Marginalisation of large populations" and „the mass production from informal labors' settlements", which are virtually "Slums". The five great South Asian historic metropolitan (Karachi, Mumbai, Delhi, Kolkata and Dhaka) contain more than 15,000 slum communities with a total population of around 20 million (Davis, 2004).

At the recent time, Dhaka has emerged as one of the fastest growing Megacities in South Asia. It had a manageable population of 2.2 million in 1975 and that became 12.3 million in 2000. The growth rate of this urbanising population during 1974-2000 was 6.9% (UN, 1998). There is no other city in the world, which has the experience of having such a high growth rate in population during this period. The United Nations (1999) mentioned this rapid population growth as 'exceptional'. The growth rate of urbanising people in Dhaka City will also continue to remain high even in the upcoming times. At 2000-2015 the expected growth rate is 3.6% and would reach a total population of 21.1 million in 2015. This will put Dhaka in 4th position on the list of the world's mega cities (UN, 1999). As this rapid growth of Dhaka City is not commensurate with its industrial development, almost about one-third of the city's population is living in slums and they are basically informal labor forces. Although the phenomenon of slums in Dhaka is as old as the city itself, about 90% of slums have developed in the last three decades.

The informal labor forces in Dhaka City faces extreme poverty due to its low level of earnings and the majority are living below the poverty line in terms of both food intake per day and expenses of basic needs. The rates of income, wage and productivity of the informal labor forces are generally low due to their lacking in capacity of skills and working knowledge. Ultimately with low capacity of knowledge and skills, they have no other choice without accepting "low-employment" or "under payment".

Pattern of agglomeration

By the Cholera years of 1830s and 1840s, the poor informal sector workers started to living in congested housing. After few years, it was also identified in American and Indian Cities (Davis, 2004). The classical definition of this type of housing can be characterized by high-density living, improper utilization of Public Goods, lack of basic services or amenities, unhygienic and polluted environment, poor literacy rate, unemployment, crime, social, moral and psychological degradation and poor health condition.

At the "regimen of congestion", characterised the new mercantile cities of the 16th century, too many people began competing for two few dwellings and rooms. The rapid influx to the cities or poor rural-urban migrants looking for jobs created a huge need for accommodation. Much of the new housing for rural urban migrants was development and re-developed by speculators seeking profits, and in the absence of controls, was built increasingly higher densities and poorer qualities (UN, 2003). The same scenario is happening now in Dhaka. 65% residents of Dhaka subsist in the informal sector (Davis, 2004). Usually the informal labor forces try to scatter around the Central Business Districts. Because from here, they can avail the maximum level of job accessibility. Nevertheless if they can scatter around the Central Business District, then they don't have to pay much for their transport cost to go to working area. This phenomenon is simply an example of location theory in the science of economics.

Background of the Informal Sectors Workers

These poor rural urban migrants are mostly from the north eastern Bangladesh. Seasonal Food Insecurity and Hunger are usual phenomena frequent in this region. Nevertheless River Erosion creates a lot of Environmental Refugees. Joblessness and without income insist these rural poor to migrate. For them Dhaka, is El Dorado, a land of Opportunities!

The process could be identified as follows:

- Background reasons for migrating to Dhaka

  Income Inequality

  Lack of Economic Growth

  In-migration

- Middle Situation

  Poverty

  Lack of affordable housing

- Outcome of the Process

  Formation of Informal Settlements

- End Results

  Eviction

Usually these rural-urban migrated people like to find some linkages in city area before their coming in the City. For example, some relatives or friends who are already living in some places in Dhaka and who could give some ideas for some job opportunities. This relationship is another big reason for their migration, and this is also the reason of spatial expansion of slums areas. It's a rare situation that the slums get smaller. In reality it always gets bigger and bigger. It absorbs these migrated rural people, most of whom are almost without any job skills.

Government's new urban land management strategy

The urban planning offices (RAJUK and Dhaka City Corporation) evaluate the marginal settlements in Dhaka mostly negative. There is an overall opinion, that Slums are responsible for the criminality and for the bad economic situation of the city. These are also the typical places for illegal drug trade, prostitution and bad possession of arms.

The emergence of such situation is an expression for poverty processes within the state, as indication of the migration within the state.

But government is interested about the pro-western city development initiatives. The World Bank financed "City Beautification Project" is worth mentionable. Under this World Bank concept, Government is now interested to prepare some new and so called modern urban land management strategies, and with these strategies the city would be solely for the rich people, those who can afford high living standards. But there is almost no indication of proper settlement/re-settlement planning and management for this large group of informal labor forces.

There is a law, that the Government should inform the dwellers at least before the seven days of eviction. But unfortunately, it is now only written in paper, no implication in reality. In some rules, Government is also responsible for the re-settlement of these people. But its also very utopian thought in Bangladesh context.

In August 2000, there was a fact finding mission from Asian Coalition for Housing Rights. They did investigation regarding large scale eviction in Dhaka with a local NGO, Center on Housing Rights and Eviction (COHRE).

The basic points and finding from this fact finding mission are as follows:

1. 100,000 people (20,000 households) in 44 settlements were evicted and lost their homes and assets. Most of these evictions happened without any prior notice. Bulldozers and demolition crews were accompanied by huge number of polices in riot gear.

2. Majority of those evicted people were single mothers with children, and many of them were working in the city's 2,000 garment factories located around the city center. Most lived close to their jobs and job opportunities as it is not possible for them to afford transport cost. Due to the government policy regarding the new urban land management policy and zoning, practically they also had to lose their jobs.

3. Government's new policy regarding urban land management or urban management was a violation of Local Government Act, the Constitution of Bangladesh, international covenants, conventions and commitments. These were recognized by the international community and agreed and signed by the Government of Bangladesh.

4. Government had promised for the resettlement costs and also for better transports and assessibility to jobs. But its was always an utopian statement; it happened never in reality.

Impacts of slum evictions

The first resolution of 1987 „Commission on Human Settlements" was 'The practice of forced evictions constitutes a gross violation of human rights, in particular the right to adequate housing.' It was also written, '..forced eviction and homelessness intensify social conflict and inequality and invariably affect the poorest, socially, economically, environmentally and politically most disadvantaged and vulnerable sector of society.' The 'Government Build-

ing Ordinance 1970 says that a 30-day notice requires for a legal eviction of unauthorized occupants. But in reality, most of the times, they don't get even a 24 hour notice to leave their shelters.

There are really very high level of negative impacts of evictions, which are basically initiated due to Government's Urban Land Management and Urban Development Strategies. The impacts appear both in short term and in long term.

For discussion we could divide the impacts as follows:

1. Economic Impacts
2. Social Impacts
3. Political Impacts
4. Environmental Impacts
5. Institutional Impacts

We could discuss the scenario a bit detail as follows:

Economic Impacts

Most of the working opportunities of the informal labor forces are concentrated near their housing place. Their income sources are not stable and also the income level is unstable. They are the first victims of any unexpected situations. They are usually not skilled. Very few of them have some vocational training and also very few of them have access to micro-credits provisions. So whenever they are evicted, they are also in the way of loosing their jobs and jobs opportunities. In Dhaka, most of the job opportunities for the informal sector are concentrated near the City Centre.

When they are evicted, they are usually supposed to be re-settled in much away than the city centre. Jobs opportunities are naturally not as good as city centre. Due to the transport cost, it is also very difficult for them to travel the city centre for their jobs. Economically it is not viable.

Another reverse scenario happens in the city centre and near the city centre. As there appears a paucity of informal labor forces, the impacts and result come to any products' services or prices. Price level goes up beyond the affordability of normal people.

Social Impacts

Like any other Mega city, jobs accessibility is the pre-requisite of social stability and a healthy urban livelihood. In Dhaka, a major portion of people are involved directly or indirectly in informal sectors. If they loose their jobs, the scenario is really very painful. Low rate of education, vocational training and low access to micro credit make them frustrated, helpless and hopeless. A major portion of them get involve with different types of criminal activities. Drug addiction, prostitution and arms dealing are worth mentionable for these job looser informal labors.

Political Impacts

Due to the Government initiated Urban Land Management and Planning, evicted people sometimes utilised by political parties. In most of the cases, this malpractice of politics in Bangladesh creates big losses of life and assets. Bangladesh is a country where corruption and politics are almost synonymous, and in this situation informal labor markets, eviction and urban land management are also gripped by mal-policies and politics.

Environmental Impacts

Living condition in informal settlements is relatively worse than the planned settlements. Eviction means the another new informal settlements are in another places. In Dhaka, the City Corporation is not financially and institutionally so strong that they could provide the urban services to all informal settlements. In most of the cases, Government can't provide even the least urban services to all the informal settlements. That means the new urban land management policy is also a impetus for expanding urban environmental

problems.

Now all through Bangladesh, it's a big discussion that the Government initiative regarding cleaning the city for modernism, whether it is a initiative of „poverty generation process"or "step up for better livelihoods".

Conclusion

The important message of this paper is that the informal settlements and urban poverty are not just a manifestation of urban population growth and demographical change, or even of the vast impersonal forces of globalisation. The informal settlements, which are virtually emerged as the settlements of informal labor forces, must be seen as the result of a failure of housing policies, laws and delivery systems, as well as of national and urban policies.

Government can't deny the importance of labor forces in informal sectors. Without making any provisions for jobs and livelihoods, the process of the eviction in nothing but making the total "city management" system to a collapse. The numbers of the rural-urban migrants are increasing in Bangladesh day by day. They have no definite future and job opportunities even in Dhaka City. When they are evicted according to the Government's new policy, the frustrations come to the pick. Then it is, in reality, no more a City Beautification project or steps towards better urban livelihoods, it turns to a Government initiated poverty generation process.

The problem, which is a physical and spatial manifestation of urban poverty, should be treated from in holistic approach; not only from policy perspective, but also from peoples views and participation. It should be some long term strategies and simultaneously some short term strategies. But for instance Government and the Donor Agencies should realise the scenario both from Micro Level and Macro Level.

Proposals could be stated as follows

Macro Level

The Government should to identified, why there are so many rural urban migrants and why these migrants live in poor housing in the city Dhaka. Government should also think for better accessibility of jobs and transport costs for the poor. There is a popular statement from the Government's side, that they don't have enough finance for the upgrading the living condition of the informal labors. It couldn't be true. Major reasons are corruption and lack of political will. Macro level proposals could be identified as follows:

1. Integrated Nation-Wide Rural Development Plans and Projects
2. Accessibility of Micro Credit Program for most of the Informal Workers
3. Rural Growth Centre Development
4. Decentralisation of Administration and Business Centre
5. Government shouldn't always adopt the Westernised Idea.
6. Government should think for the better accessibility of works and jobs for informal labor forces during any types of renovation or re-development or eviction.

Micro Level

How Government can resolve the problem? Government should incorporate the people about the entire development process. Just to say "Good Bye", is really not a good and sustainable solution. Following could be some options to make better participation:

1. Government should adopt PPP (Public-Private Partnership) Method for all development works.
2. Government should resolve the problem by mass community level campaign.

After all, in any case Government of Bangladesh has to concentrate on the human development in rural areas. Otherwise any of their plans and projects would be pathetic impetus for Urban Collapse and the miseries of informal labor forces would be enormous.

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7.15 Brownfiled Sites in the City of Brno

Marian Böhm

ABSTRACT

The changes in the political and economic conditions after 1989 results to a great drop in industrial manufacturing and a shift of the workforce from manufacturing to the service sector and abandonment of original industrial sites. Currently a new master zoning plan is being drawn up, in which the revitalisation of brownfield sites is one of the basic principles behind the development of the area. Since March 2006 both manufacturing and non-manufacturing brownfield sites within the city have been registered in the database that forms a part of the „brownfield map"which may be used as a basis to draw up brownfield type investment proposals. As an appendix to this text there are two completed examples, which can be used to present the positive approach used to preserve the existing cultural heritage for a new purpose. The revitalisation of the former Vankovka engineering works and the former city abattoir.

The appearance of the first brownfield sites in Brno came with the changes in the political and economic conditions after 1989, when significant macro-economic changes took place. The main changes were in the nature of manufacturing sites, where the poor economic situation faced by large industrial companies meant the loss of traditional markets. The result of this was a great drop in industrial manufacturing and a shift of the workforce from manufacturing to the service sector.

Brownfield sites are therefore a spin-off feature of the post-industrial phase of the development of society and form to a great extent a part of the important industrial history of the city.

As a result of their original use, these sites often tend to be contaminated or otherwise abandoned, which lessens their attractiveness for future development.

Figure 1: Gone-by military barrack

On the other hand, the city also has no-called non-manufacturing brownfield sites, which include former agricultural areas, military premises, disused railway land and unnecessary public facilities.

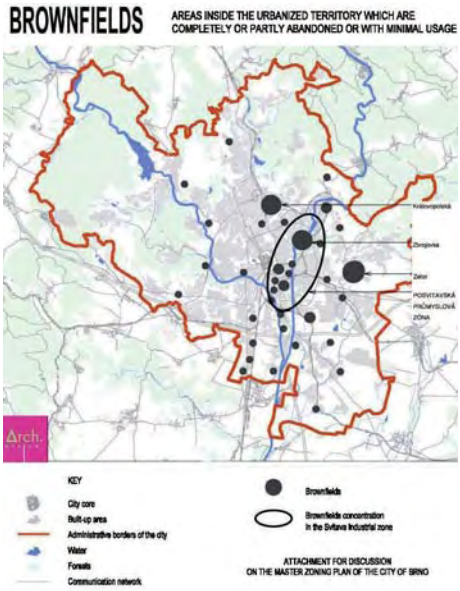
At the end of the 1990s another feature began to appear - suburbanisation. This involves the resurgence of commercial and residential units outside urban built-

Figure 2: Unimproved part of Zetor factory

up areas along with all the negative effects on transport, social structure and natural environment. One of the ways of regulating encroaching suburbanisation is the long-term revitalisation of brownfield sites.

Because of the complexity and expense involved in solving the problem of brownfield sites, private capital tends to be discouraged from making any effective intervention. Significant economic losses come as a result of the existence of brownfield sites that are lying in waste in the centre of cities, not providing a source of tax income. Of most importance in today's market environment are the unequal conditions that exist in comparison with undeveloped building sites. The solution to the problems posed by such sites is a political, economic, social, ecological and town planning task of utmost importance. It is a complicated problem that is of inter-departmental and inter-professional import at national, regional and local levels, for which it is necessary to obtain emphatic political support. In drawing up projects for the revitalisation of brownfield sites, the aim of which should be to extract the maximum amount from their existing potential whilst preserving the existing cultural heritage, financial support at a national and European level will continue to play decisive role.

Currently a new master zoning plan is being drawn up, in which the revitalisation of brownfield sites is one of the basic principles behind the development of the area.



One of the conditions behind the successful progress of this process is a transparent inventory (registration) of brownfield sites, which would serve as a basis for the planning of suitable future land use and their introduction to the market. Such registration must be carried out using an integrated method of registering brownfield sites in the database in order that they may be compared with those in other cities and regions. Unfortunately to this day no integrated approach to the registration of brownfield sites has yet been set up in the Czech Republic.

Since March 2006 both manufacturing and non-manufacturing brownfield sites within the city have been registered in the database that forms a part of the „brownfield map". The proposed methodology for the processing of the database is based on the results of the research project for the Czech Ministry for Local Development entitled „the revitalisation of neglected areas for local authorities. Through the Planning and Development Department of the Brno City Hall and together with the Office of the City Strategy, the City of Brno has been one of the project partners. The brownfield map, as a technical planning platform, will continue to be used to

present the problem of brownfield sites in the city, forming a part of the information showing the intensity of built-up land use, and may be used as a basis to draw up brownfield type investment proposals. A simplified version is available on the City of Brno website.

The register includes only a partial list of disused or used brownfield sites of 0.5 ha upwards (where a max. of 30% of the extent of the area is used). The database that includes basic information on areas with a qualitative evaluation also includes those areas where revitalisation is under way. Within the city limits there are 117 registered such areas, measuring 509 ha in total, and brownfield sites form 6.2% of the total area of the city. The majority of these localities are areas that are used only to a minimal extent, usually by tenants, for wholesale and discount sales outlets, low-level office and warehouse use, and similar. Manufacturing brownfield sites form 73% of the total, and the greatest concentration is in the area of the Posvitavská industrial zone to the east of the city along the River Svitava in close proximity to the historical centre, where brownfield sites form 14% of the total area.

As an appendix to this text there are two completed examples, which can be used to present the positive approach used to preserve the existing cultural heritage for a new purpose. The first example is the revitalisation of the former Vankovka engineering works.

Vankova - Former Factory

Vankovka – the former Friedrich Wannieck engineering works were established in 1865 on Trnitá Street. The first items manufactured at the engineering works were sugar diffusers, but over time the manufacturing range expanded to include steam engines, boilers and other engineering products. This led in turn to the expansion of the premises with the construction of other manufacturing shops, some of which were designed by leading architects of the time - A. Prasrtorfer and G. Wanderley. It was during this period that the area underwent its greatest boom and reached its greatest extent – 2.2 ha.

Figure 4: Vankovka factory in the year 1921

The building complex was developed over a period of time, but the majority of the buildings have not been preserved in their original form. At the beginning of the 20th century the Vankovka engineering works successfully merged with the První brnnnská strojírna (First Brno Engineering Works). When it was built, the works were outside the fortifications surrounding in the historical city centre but, thanks to the construction in its immediate surroundings during the 20th century, the Vankovka works over time in effect found itself almost in the city centre.

Figure 5: Vankovka bevore revitalisation

Vankovka Shopping Centre – this is a successful example of the revitalisation of the original Vankovka factory and its foundry and engineering works, which is once more functional after more than fifteen years, but this time for a different purpose, which brings the city benefits and income. This completed project provides

proof that old and new alongside one another can exist in tandem, an example being Ve Vankovce Street, which bisects the former premises and divides the new shopping centre and the reconstructed art gallery from each other. This pedestrian-only street that runs along the former crane track forms the exterior core of the entire complex.

From the beginning of the 1990s it was the aim of the city to fulfil the expectations of the inhabitants of the city and to find a reliable investor for the Vankovka premises. The revitalisation plan was first made public in 1993. In 1994 the Vankovka Foundation was established, the aim of which was to support the reconstruction plan and the resurgence of the area, working together with non-governmental organisations in order to achieve this aim.

After lengthy discussions it was made possible to transfer the ownership of Vankovka as a protected monument from the state-owned Zetor company in 1996, and in 2000 the city of Brno became the owner of the premises.

Soon afterwards a German investor – ECE - came forward and presented the city with its plan to construct a shopping and social centre under the name Galerie Vankovka, which was consulted and modified on the basis of communication between the city, the investor and representatives of the Civic association particularly with regard to the monument protection of the existing buildings.

In the end only a part of the exterior façades of the Foundry and Core Rooms was preserved in the construction of the centre. The new shopping and social centre with its 300-metre long shopping arcade and illuminated central rotunda, opened in March 2005, offers a total of 130 shops with a floor space of 38 000 m2 and parking for 1000 cars.

The remaining Engineering Works and Administrative Building, both protected, were reconstructed by the city development company Jižní centrum (South Centre). The Administrative Building today offers premises for company headquarters and since April this year also a modern art gallery with the name WANNIECK GALLERY.

Figure 6-8: Vankovka today

During its first year of operation the Galerie Vankovka has gained several awards – for example first prize in the shopping centre category in the prestigious Best of Reality 2005 competition.

The second example is the former city abattoir.

Old industrial Architecture

The premises of the former city abattoir on Masná Street were built more than 100 years ago in the southern part of the city of Brno along the River Svitava. The oldest part of the premises was built along Krenová Street in order to gain access to the transport route leading towards the city centre. Later the site grew to the south and was divided into two sections by railway sidings – the so-called new city abattoir was built to the south under the railway viaduct in several stages at the end of the 19th and beginning of the 20th centuries, after which more buildings were constructed on the other side of Masná Street including the Meat Exchange building by Bohuslav Fuchs, which today does not form a part of the premises.

Figure 9: Beginning of the 20th century

This land was used by the meat industry until the 1990s, and in 1994 manufacturing ceased. In 1998 revitalisation work on the area began for a new owner - Brněnské komunikace a.s. (Brno Road Company), which used the premises as an administrative and storage centre.

During the one hundred years of development the land changed considerably. Buildings within the abattoir premises were constructed in a historical style as part of a pure urbanistic plan. The different stages of construction can be seen in the different building styles – the older buildings have façades where the facing masonry is of two colours; the newer buildings have façades that are combined

Figure 10: Before revitalisation

red facing masonry and rendering.

The newest of the buildings were purpose-built; nevertheless they adhered to the original land-use area plan. Further building work only serves to show the degeneration of the site, and by the end of the 20th century there was a mess of buildings of various ages, purposes and appearances which were difficult to survey and define.

When reconstructing the premises the aim was to preserve the urbanistic and architectural values of the original industrial buildings, remove all additional buildings and to use the remaining buildings for operations as far as space allowed. With regard to the buildings, the interiors in particular were rearranged and all additional building works were removed in such a manner that the area might once more become appreciable and that the original 19th century plan might become visible once more, i.e. the central core of the premises, surrounded by trees.

The premises are today fully functional, and several buildings along Porážka

Figure 11: Before revitalisation

Street and the former marketplace are registered as cultural monuments. It only remains to complete the repair of some of the façades and determine the final use of two of the so-far unreconstructed buildings.

The example of the Brno abattoir is not a typical example of land revitalisation, because it is purely a matter of replacing the original activities with new, similar, activities. A positive point is the sensitive approach to the preservation of the logical plan whilst preserving the urbanistic and architectural values even for such a simple and practical purpose. For the repairs and reconstruction the statutory city of Brno provided a purpose grant from 1998-2004, which amounted to 66% of the total investment.

Figure 12+13: present state

Figure 14: JMP in 1945

Figure 15: Before reconstruction

Figure 16+17: JMP today

Figure 18: Brno city archive today

Figure 19: Moravan before reconstruction

Figure 20+21: Moravan today

Other successful revitalisation projects include the reconstruction of the premises of Jihomoravská plynáren-ská a.s. (JMP) in 1995; the central warehouse building was awarded the title of building of the year in 1997.

In 2002 the transformation of the old city electricity generation plant into the Brno city archive was completed.

The last selected illustration is the example of the „re-use" of the former Moravan carpet factory. This was a sensitive regeneration project, which preserved the original charm of industrial architecture whilst transforming it for loft living and commercial purposes.

Many Brownfield sites in the city are still awaiting new use. One of these is the extensive 22 hectare Zbrojovka Brno engineering works, which established in 1919. In the second half of the 1920s the company became the largest manufacturer and exporter of rifles in the world. In the 1930s it manufactured typewriters, Z type cars, bicycles, aircraft motors and

machine tools.

Following the war Zbrojovka concentrated on civil manufacturing, making office and communication equipment, motors, specialist tools, hunting and sporting weapons, and the manufacture of Zetor tractors began here.

A black period in the history of the company began after 1989; the non-forward-looking production of single-purpose machines and tools was ceased, and the manufacture of sporting and hunting weapons was significantly cut. The company suffered from severe over-employment and over time faced an increasing number of problems, which came to a head in 2003 with bankrupcy.

More than 90 years of Zbrojovka history came to an end at the beginning of that year with a public auction that raised a Czech record of 707 million Crowns. The plans of the declarers, the powerful Czech-Slovak J&T finance group, are not yet known. The Zbrojovka premises form a part of the Posvitavská industrial zone in the close proximity of the city centre, and it is not expected that this area will be re-used for industrial purposes.

When regenerating this area it will be necessary to ensure its long-term sustainability and to sensitively link it to the existing urban structure. The most suitable way of doing this would be to implement a mixed land-use plan, which would include services, sports, public amenities and housing.

We believe that any future owner of this site will find a new use for it in agreement with the city leaders, in order that it may be of advantage to the city and its inhabitants alike.

8

The REFINA Programme - Research Funding as a Tool to enhance Sustainable Land Management

8.1 Research for the Reduction of Land Consumption and for Sustainable Land Management (REFINA) – Status and Outlook

Maike Hauschild, Uwe Wittmann, Gina Siegel

ABSTRACT

REFINA – The programme "Research for the Reduction of Land Consumption and for Sustainable Land Management" funded by the Federal Ministry of Education and Research (BMBF), is part of the German National Strategy for Sustainable Development. The German federal government has set the goal of reducing land consumption for new settlement and transport-related areas to 30 hectares per day by 2020. In order to provide a scientifically reliable basis for decisions and measures, REFINA supports the development and testing of innovative concepts for the reduction of land consumption. These concepts should help to achieve a multitude of goals such as the protection of the environment and conservation of nature, economic growth, socially compatible housing, quality of urban building, and mobility.

Introduction

Reducing the consumption of land and encouraging sustainable land management is the central objective behind Germany's Strategy for Sustainability. It arises from the need to treat the environment with care, particularly as continuing urban sprawl and fragmentation of the countryside is causing increasing encroachment on the natural and cultivated landscapes with negative consequences for biodiversity.

The provision of building land at nature's expense has a significant impact on the quality of life in the regions and on the development of economic potential. The demographic change in society (decreasing population, ageing society, unemployment, migration, social and cultural polarisation) is already posing enormous challenges for the cities and municipalities today. The maintenance of municipal mains supplies and waste management is also the cause of considerable economic problems in many places.

The Federal Government's National Strategy for Sustainability therefore employs a twin-pronged approach. On the one hand, it aims to reduce land consumption with new housing and transport areas to 30 ha per day by 2020. On the other hand, it aims to qualitatively improve the utilisation of land for housing and trans-

Figure 1: REFINA logo

ported-related purposes, and to improve the quality of life and economic development in the regions.

These aims are to be supported by the programme "Research for the Reduction of Land Consumption and for Sustainable Land Management" (REFINA), which is rooted in the measures adopted by the federal government in 2004 for the realisation of the National Strategy for Sustainability. REFINA was announced in the Bundesanzeiger on 26.10.2004.

With the announcement of REFINA, BMBF hoped to demonstrate that it would continue to fund the innovativeness of all social actors in cooperation with science in order to support the necessary paradigm shift in addressing the issue of land areas within Germany and putting knowledge into practice in a targeted manner.

It makes use of the experiences and results gained from the research programmes funded by the Federal Ministry of Education and Research for the remediation of contaminated sites and urban development, coupled with those of the ExWost and MORO research programmes supported by the Federal Ministry of Transport, Building and Urban Affairs (BMVBS), and research projects carried out on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

In their Coalition Agreement of 11.11.2005, the federal government stated that they would "strive for a reduction in the spread of land use to 30 hectares/day by 2020 in line with the National Sustainability Strategy and develop financial incentive instruments for land resource management".

The Federal Ministry of Transport, Building and Urban Affairs, the Federal Ministry for the Environment, and the Federal Ministry of Education and Research are tackling this task on behalf of the government in close cooperation with each other.

REFINA – Priorities

REFINA aims to develop and test innovative concepts for the reduction of land consumption and to use these concepts to bring a number of different goals such as environmental protection and the conservation of nature, economic growth, socially compatible housing, quality of urban building and mobility into harmony.

Along with ecological, economic and social issues, such as equal rights, participation and education, urban quality will also be considered. Relevant interest groups from politics, administration, industry and society at large should be involved from the very beginning so that the issues at hand can be worked on with practical applications in mind.

An important objective of the research programme is the preparation and application of model multidisciplinary planning and management concepts together with innovative strategies for reducing the consumption of land and encouraging sustainable land management.

In order to achieve these objectives, the federal government departments and the federal states have agreed that REFINA will focus on the following three priorities:

I. Model concepts for innovative land management in selected regions with different development conditions

New solutions for innovative land management are to be drawn up within the framework of integrated and interdisciplinary model concepts.

The model concepts will be developed for individual sites, municipalities or regions. Interest will be focused on practically relevant examples with the participation of relevant actors and decision makers, and will be accompanied by scientific research.

The model concepts should cover different types of land, land use and specific regional constraints. Model concepts for

both local and inter-regional areas are sought.

II. Analyses, methods and evaluation methodology for sustainable land management and land recycling

The aim of this priority is the further development of existing instruments for sustainable land management. Attention is focused on the following topics:

A. Development of solutions for the revitalisation of brownfields and contaminated sites (land recycling), as well as the development of strategies for safeguarding and improving the quality of the environment in cities and towns, e.g. within the framework of compact housing developments

B. Establishment of the necessary conditions for evaluation concepts with comparable standards for the evaluation of the conservation value of selected lands and the assessment of soil quality using detailed concepts of soil and land conservation

C. Methods for differentiated regional and inter-regional analyses and assessments of the sustainable development of settlement areas (data basis, data management, trends and scenarios)

D. Improvement of the methods and instruments used for sustainable land management with regard to legal, urban, social, ecological, economic and organisational aspects on the basis of actor- and institution-based perspectives.

III. Development of new information and communication structures

By promoting this area as a priority, public awareness and understanding of the problem should be improved. Communication between the actors involved in land management should also be made easier. Funding has been made available for example for new methods and concepts for consulting services and public relations, as well as education and training; the dissemination of good examples of sustainable land management; the further development of existing databases, environmental information systems, expert systems and decision support systems for the detailed monitoring of land recycling and land management as well as the differentiated recording of the use of soil and soil quality; measures for the exchange of knowledge with other countries as a contribution to global, precautionary, sustainable soil protection and land conservation; and the construction of interdisciplinary and transdisciplinary competency networks.

The course of action chosen in setting the priorities corresponds to suggestions from the "Dialogue on Land Use" (Dialog Fläche) conducted by the German Council for Sustainable Development in 2003 and 2004, the results of which were incorporated into the preparation of the research programme.

In its official recommendation "More value for land: the 30 ha target", the Council advocated to the federal government that the dialogue be continued and that the creation of best-practice examples be supported. As a research programme, REFINA will contribute significantly to this.

The suggestion by experts not to concentrate funding on technologically oriented projects alone, but also to acknowledge innovative ideas from all social actors, has been actively incorporated into REFINA.

Status

After the programme was announced, over 200 project proposals from research groups in universities, the municipal sector and industry were received (141 for REFINA I and II, plus 60 for REFINA III), in which over 1,000 institutions participated. The proposals were evaluated in April 2005 (REFINA I and II) and October 2005 (REFINA III) by a jury made up of internationally respected experts from the federal

government and state departments along with scientific establishments and NGOs.

In 2005, 36 project collaborations and individual projects with a high potential for innovation and application were selected for funding by BMBF. Work is currently underway on 92 projects. A further 28 projects are being decided upon. Table 1 shows the distribution of actors across the projects. Almost all of the projects include the municipal sector or private property owners.

Table 1: Distribution of projects

Project participants	**Total**
Municipalities	14
Companies	23
Research institutions	47
Associations	12
Engineering consultants	24

The implementation of REFINA involves the participation of

- federal ministeries and agencies,
- federal states,
- the municipal sector, local authorities, regional organisations,
- real estate companies, banks, insurance companies, savings banks,
- central German associations of local authorities, such as the German Association of Cities, the Deutscher Städte- und Gemeindebund (German association for towns and municipalities), the German County Association,
- non-profit professional associations, such as the Ingenieurtechnischer Verband Altlasten e.V. (ITVA; society for remediation engineers),
- business associations, such as BDI,
- nationwide citizens' organisations, such as the Federation for Nature Conservation in Germany (NABU), the Federation for the Environment and Nature Conservation in Germany (BUND), the German Heimatbund, and regional and community citizens' initiatives

in projects and also in conferences and workshops. This testifies to REFINA's broad social base.

Outlook

The BMBF State Secretary, Meyer-Kramer, together with the responsible department heads from BMVBS and BMU emphasised the high expectations surrounding REFINA at the REFINA kick-off event on 16 and 17 February 2006. They also highlighted the reduction of land consumption and the achievement of this goal as an enormous joint undertaking that requires the cooperation of a wide variety of public and private institutions.

This should ensure that REFINA will be managed as a learning programme that is open to all and that the communication and information structures required to make this a reality will be established.

REFINA aims to develop and test new concepts for the following areas of application:

- regional model concepts
- innercity model concepts
- conversion of former military sites
- land recycling
- shrinking regions
- soil assessment / land evaluation
- economic concepts
- awareness of the problem and new communication structures

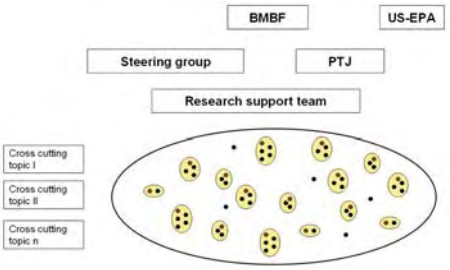


Figure 2 REFINA structure and actors

Figure 2 illustrates the structure of the REFINA programme and the actors involved in it. Cooperative projects and individual projects constitute the core part of the programme funded by the BMBF. Project Management Jülich (PTJ) manages REFINA scientifically and administratively.

The task of accompanying the highly complex REFINA projects both on a project-specific and an interdisciplinary basis is performed by the German Institute of Urban Affairs (Difu). The research support team (Projektübergreifende Begleitung) provides the necessary communication and information infrastructure.

Furthermore, the implementation of REFINA is supported by a steering group (Begleitkreis) made up of experts from other federal ministries and agencies as well as selected federal states and associations.

The task assigned to this body, set up in January 2006, is to offer the research projects critical support from a user's point of view and to facilitate the flow of new knowledge from departmental research into REFINA and vice versa. Selected projects are presented on a continuous basis and cross-project issues are discussed for this purpose. Moreover, better use of existing findings is to be achieved and efficient cooperation with departmental research is to be supported.

Foreign experts from Austria, France, Switzerland and the Netherlands will also participate in a number of the REFINA projects, so that other approaches and experiences can be exploited.

Furthermore, as part of the bilateral cooperation between BMBF and the U.S. Environmental Protection Agency (US EPA), close cooperation with American experts will be organised on a project-by-project basis in order to critically reflect on the soundness of the concepts developed and to set new unconventional courses.

The success of REFINA will be measured over the coming four years with successful examples of the scientifically justified remodelling of development plans and land utilisation plans, as well as the contribution made to the recycling of inner-city brownfields as an important indicator of economic land utilisation. BMBF has made around 20 million Euro available until 2010 for studies that began in spring 2006. The first results are already available and will be presented by the investigators at the REVIT & CABERNET 2007 Conference among other events (see other papers from the REFINA sessions in these proceedings). Results will be presented as soon as they become available, parallel to ongoing research. Research will be outlined on both a project-specific and general level in workshops and expert talks, where it will be critically discussed with the specialist community. Potential users and interested members of the public will learn of the results and findings promptly through publications and various public relations channels. This will also give rise to comments and suggestions for improvement that will then be incorporated into the adaptive programme.

Public Relations

- Website: www.refina-info.de
- Quarterly newsletter
- Annual status seminars
- Biannual expert talks and workshops in consultation with the steering group
- Regional workshops

- Active participation in conferences, e.g. CABERNET 2007
- Publication of best results in the REFINA series (first volume with preface by the State Secretaries of BMBF, BMVBS and BMU published in February 2006; this volume to be published as the conference proceedings of the REVIT & CABERNET 2007 Conference in April 2007)

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Web sites relating to REFINA:

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Federal Ministry of Education and Research (www.bmbf.de)

Federal Ministry of Transport, Building and Urban Affairs (www.bmvbs.de)

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (www.bmu.de)

German Council for Sustainable Development (RNE) (www.nachhaltigkeitsrat.de)

Federal Office for Building and Regional Planning (www.bbr.bund.de)

Federal Environmental Agency (www.uba.de)

Project Management Jülich (www.fz-juelich.de/ptj/refina)

BMBF Funding Priority KORA (www.natural-attenuation.de)

BMBF Funding Programme "Research for Sustainability" (www.fona.de)

Database for Land Recycling (www.flaecheninfo.de)

U.S.-German Bilateral Working Group between BMBF and US EPA (www.bilateral-wg.org)

REFINA

REFINA – The programme "Research for the Reduction of Land Consumption and for Sustainable Land Management" funded by the Federal Ministry of Education and Research is part of the German National Strategy for Sustainable Development. The German federal government has set the goal of reducing land consumption for new settlement and transport-related areas to 30 hectares per day by 2020. In order to provide a scientifically reliable basis for decisions and measures, REFINA supports the development and testing of innovative concepts for the reduction of land consumption. These concepts should help to achieve a multitude of goals such as the protection of the environment and conservation of nature, economic growth, socially compatible housing, the quality of urban building, and mobility. On the part of the federal government the Federal Ministry of Education and Research, the Federal Ministry of Transport, Building and Urban Affairs, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, and their agencies are tackling this task in close cooperation with each other.

Bundesministerium für Bildung und Forschung

Bundesministerium für Verkehr, Bau und Stadtentwicklung

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

ptj Projektträger Jülich Forschungszentrum Jülich

Bundesamt für Bauwesen und Raumordnung

Umwelt Bundes Amt Für Mensch und Umwelt

8.2 Management Development and Vegetation (MDV) Pilot Project for the Regional Park Maintenance Scheme Emscher Landscape Park 2010

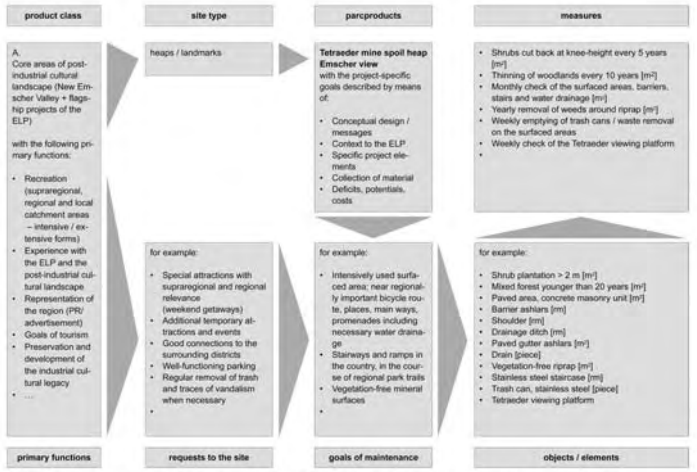
Jörg Dettmar, Peter Rohler

Goals

At the centre of the herein presented R&D project is the development and implementation of innovative strategies for a sustainable, regionally-tuned concept for open-space management and maintenance in the Ruhr district. The main area of focus for this undertaking is the Emscher Landscape Park (ELP), which represents the largest and most developed regional park in Europe with its 45,754 ha and almost 180 realised and approx. 250 planned projects (see Dettmar & Ganser 1999, Rohler 2003, ProjektRuhr 2005). Until now the coordinated management and maintenance of regional greenspace networks hasn't been the object of research nor has it played a role in other regional park schemes. In the long-term the research results are to be applied to other regional parks.

The examination of existing quality objectives and the development of new and comprehensive ones for the various open-space types in the Emscher Landscape Park is an essential prerequisite for a sustainable land-use management. On the one hand opportunities based on economic realities and the special interests of the property owner must be respected. On the other hand a plausible position backed by theory is necessary when faced with questions concerning the look of future cityscapes in the Ruhr district.

Furthermore the developed quality objectives will be combined with forward-looking questions that arise from the further development of urbanised regions to give important feedback. The chaotic growth (urban sprawl) (see Sieverts 1999), the demographically-based shrinkage and demands of sustainable development provide the framework for this discussion (see Körner 2005).



Grafik: Classification of the parcproduct „Tetraeder mine spoil heap Emscherview" into the system of a Regional Maintainance Scheme Emscher Landscape Park (Feb. 2007)

Foundation

Successful land recycling depends on a corresponding demand for real estate and land. In the light of the shrinking population of the Ruhr district a very limited demand will be contrasted by a surplus of (derelict) land in the foreseeable future (see Junkernheinrich & Micosatt (2005)). The Emscher Landscape Park was and still is the (regional) planning instrument that is to accompany the growth in open spaces, make use of the inherent chances for the region and simultaneously limit the inherent risks.

As such, three central fields of research arise from the development of the Emscher Landscape Park:

- Can a definition be found for differentiated quality objectives based on location, which is borne by all parties? Is the coordinated implementation of the corresponding measures possible in spite of the difficult financial situation?

- Which design-related tasks arise against the backdrop of constantly changing urbanised landscapes? How can suitable guidelines be developed and communicated and how can they be implemented within the framework of maintenance and care for open spaces?

- What potentials are there concerning the implementation of sustainable open space management, use and maintenance with regard to the anticipated growth in open space?

The development of the Emscher Landscape Park 2010 Masterplan provided a first opportunity to critically discuss the importance of care and long-term maintenance as key factors concerning the future sustainability of the regional park (ProjektRuhr 2005). Although the open spaces of the regional park are currently being maintained, this is achieved by various proprietors each acting according to their own mission, ideas and resources. Until now, regional coordination and dialogue have been entirely lacking and there hasn't been any development of collective goals with regard to quality. As a result, the standard of maintenance is varied and in some cases entirely deficient. In certain areas, continued public funding for the development of new greenspaces even appears to be endangered as funding prerequisites are not met due to deficient or faulty care.

The applied for R&D project is conceived as a pilot project for a regional park

maintenance scheme, which is based on a prototypical investigation corridor of two of the seven regional greenspaces in the Emscher Landscape Park. Its purpose is to put the topic of sustainable development of the urbanised landscape at the centre of a regionally coordinated project and to provide the RVR with the management tools it will require in its future role as the supporting organisation for the Emscher Landscape Park. At the same time, standard approaches for high-quality, sustainable management of urbanised landscapes will be developed, and involved parties will be integrated into the regional park scheme in their areas of responsibility.

Parties

The R&D project is unthinkable without the central and regionally important proprietors in the Ruhr area. In detail, the project has the following partners:

- The Regional Association of the Ruhr (RVR)
- The sewage associations Emschergenossenschaft and Lippeverband (EG/LV)
- The cities of Bochum, Bottrop, Essen, Gelsenkirchen, Gladbeck Herten, Recklinghausen
- The Federal Waterways and Shipping Office (WSA)
- The Federal Highway Administration – North-Rhine Westphalia (NRW)
- The NRW State Development Society (LEG) as the trustee of the NRW's real-estate fund
- The Forest Administration NRW, Wald und Holz, represented by the Recklinghausen Forestry Office as the supporting organisation for the project "Industrial Forests Ruhr Region"
- The Montan Real Estate Company (MGG) a subsidiary of Ruhrkohle AG

Work Status / Results

The research project is divided into two parts:

- The practical planning part with the goal of laying the foundation for a regional park maintenance scheme in the Emscher Landscape Park within the framework of a pilot project
- The scientific-theoretical part that examines the possibilities for improvement in sustainability for urbanised landscapes through a new maintenance and development scheme for greenspaces, with the Ruhr area acting as an example

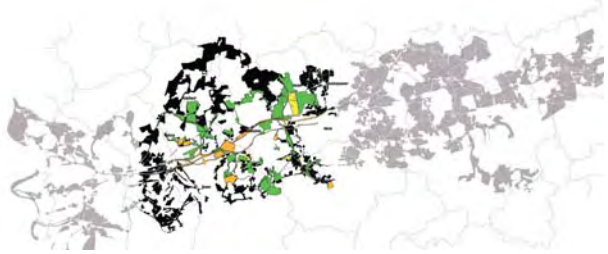
Both parts will be combined exemplarily with actual sites serving as illustrations.

Practical planning part

The starting point for the site selection within the investigation corridor were the site declarations from the participating project partners. Through intensive dialogue with the partners an attempt was made to assure that the selections represented the different site types. While processing the data it soon became apparent that the individual sites did not automatically match the separate projects that would make sense from a regional perspective. Often the existing projects, which are made up of many individual sites, have multiple proprietors because of their spatial-typological location between cities. This situation, which is typical for projects in the Emscher Landscape Park, not only contributes greatly to the implied maintenance deficits, but also requires alternative view points for the "defined projects" on the one hand and the project partners' "declared sites" on the other. Whereby the "declared sites" always make up a subset of the "defined projects".

In this way approx. 90 project sites were singled out, which will be subject to closer examination. The wide range of site types

found in the site pool mirror the distinctive potentials of the future regional park maintenance scheme.



The content control within the "MDV" framework constitutes a product-oriented approach, which finds its analogy in two levels of operation:

- On the regional park level, an affirmative structural transformation of an actual place and infrastructure
- On the level of local and regional open spaces valuable to the regional populace

Thus, the recommendation of the Emscher Landscape Park 2010 Masterplan, which sees the ELP divided into four different product classes (see ProjektRuhr 2005), was accepted and further developed. As such, the ELP is divided into the following product classes:

A. Core areas of the post-industrial cultural landscape (New Emscher Valley and the ELP's regionally important 'flagship projects')

B. Post-industrial cultural landscape (very industrially transformed areas with high residential density in the regional green corridors A/B/C/D)

C. Post-industrial cultural landscape dominated by agriculture and forestry (in the regional green corridors E/F/G)

D. Primary nature conservation areas

Within this simple division the site type level forms groups of park products. The previously mentioned individual "defined projects" are defined as the park products.

The classification of individual park products into one of the four product classes is not primarily made for the differentiated study of all possible open-space function and types of public and private green and open spaces, but more to work out regional specifics and prioritise certain regionally-typical attributes that make up the image of the regional park. The origins of this approach – already in the analysis construed as a method of planning rather than being scientific – is the existing urban landscape with its diverse characteristics in the seven regional green corridors and the central east-west green corridor with the New Emscher Valley.

As a consequence there is also the talk of primary functions, which were assigned to the individual product classes and are operationalised based on the properties of the individual park products. This operationalisation is made on the one hand via a comparatively general checklist, which is based on the primary function level and poses requirements, for example, for the "goals of tourism": guarantee of intact trails, functional parking, a clean overall impression, etc. On the other hand it is made via a differentiated description of goals, which is based on the conceptual

and planned goals of the individual park product and above all takes into account special site characteristics.

The description of the goals of individual park products is supplemented by an object catalogue, which is tailored to the needs of the Emscher Landscape Park and is compiled in a manner consistent with a product-oriented approach (see Klärle 2006,: 50f / Buhmann and others 2000).[1]

The relevant geoinformation will be administrated and processed with a GIS (Geographic Information System) to achieve two goals: Firstly, to use the existing data from the different project partners; secondly, to give the product partners insight and/or access to the data that is of utmost importance to them.

In detail, data from the product partners was collected on two levels:

1. On the "defined project" level
   - The geoinformation about the regional development planning
   - The geoinformation about the zoning plans
   - The geoinformation about the landscape planning
   - Stop information from the public transit network (VRR)
   - Brownfield site list
   - Actual utilisation mapping from the RVR related to the project sites themselves and the surrounding area (one to three km radius)
2. On the level of the project partners' declared sites
   - Maintenance deficits and problems
   - Maintenance and service costs
   - Standard of maintenance

The data which is collected from the defined projects is primarily meant to help choose the goals for the individual site, whereas the data from the declared sites is primarily collected to steer future maintenance.

The actual assembly of the data resources, which are to be a foundation for the regional park maintenance scheme, faces many difficulties[2]:

- A part of the necessary vector data was only available as pixel data (pdf, jpg or tif) and had to be digitalised manually.
- The data resources from the individual project partners were of a varying quality (information in parts digital and comprehensive, some of the project partners' information is missing and/or not or insufficiently digitalised).
- The existing databases have limited content compatibility (for example, the categorisation of formal and informal planning).
- The submitted digital vector data were not compatible because of different digitalisation methods and had to be pieced together on a standardised scale of 1 : 5,000 (DGK5).
- The majority of the accessible databases from GIS systems had to be reviewed and edited for the research project (for example, the public transit stop data from the VRR to assess access to public transport, categorisation of zoning and landscape plans).

The abundant zoning, planning and project data for the various locations finds its way into a corresponding database,

1 Hereby it became apparent in the starting phase that not all of the project partners had such catalogues, or that the object catalogues differed greatly in detail. This corresponds above all to the degree of differentiation.

2 The named difficulties will probably be run into at varying degrees when implementing and assembling similar databases. Especially when data from various project supporters and parties are combined.

which allows for inquiries related to the research project. It also offers a foundation for the future regional park maintenance scheme and an effective and user-friendly administration tool.

The captured geoinformation is issued on standardised data sheets, which are produced with the help of GIS software.

Scientific-theoretical part

The scientific-theoretical part of the project dealt with reviewing and evaluating the existing positions, approaches and research in the field of urban sprawl. This step forms the basis for further treatment of the question of whether the development, design and maintenance of the green and open spaces is an appropriate instrument that will lead to sustainable development and improvements in design quality for urbanised landscape and conditions in the urban sprawl of the agglomerates.

The build-up of a regional ecological cycle constitutes one possible field of research. Closely related to this is the search for new economical markets in the Emscher Landscape Park, which can help finance maintenance in the mid to long range.

In this respect, three project approaches can currently be developed for or on the Emscher Landscape Park sites:

1. Rainwater harvesting

Together with the Emschergenossenschaft a total of approx. 12 residential areas were identified where the decoupling from the water supply network and decentralised rainwater harvesting failed due to, amongst other things, a lack of available land. As a result of a detailed analysis three different exemplary project areas in and around green corridor C were chosen:

- Boymannsheide Bottrop housing development – conversion of a water catchment to a new watercourse so that the bordering developments can also be decoupled
- Isolated housing development – Eichkamp development in Gelsenkirchen Resse – decoupling of the forest settlement through the consolidation of neighbouring woodlands
- Resser Mark subdivision in Gelsenkirchen Resse – use of neighbouring woodlands for rainwater harvesting

2. Decentralised sewage treatment

The assumption that the decreasing population in the Ruhr area would result in some housing developments becoming so thinly populated that the maintenance of the sewage system would no longer be economically viable has, after an in-depth analysis, been proven wrong. Talks with the Sewage Authorities, Environment Agencies, City Planning Departments and statisticians in Gelsenkirchen and Essen didn't find any correlation here. The current – although not yet thoroughly founded – findings show, that in both cities a diffused, evenly distributed decrease in populations is taking place. There are districts which are hard hit by the decrease, such as Gelsenkirchen Rotthausen or Essen-Stoppenberg, but there aren't any vacancy concentrations in any residential area which are a cause for alarm. The vacancies are apparently spread-out. Further detailed analyses of selected residential areas are nonetheless to be conducted.

The close contact with City Planning in Gelsenkirchen has resulted in a slightly different approach to the subject of decentralised waste water management:

The former children's hospital Gelsenkirchen- Erle/North is being moved. The existing isolated housing development in the middle of green corridor D is to be transformed into a premium residential area. Whereby, a decoupling from the central sewage disposal system makes economical sense because of the location. Furthermore, elements of a sustainable residential development can be tried out here in an exemplary fashion. To this end a detailed urban planning study will be conducted by architecture students of TU Darmstadt under the auspices of the MDV research project in the Summer semester 2007.

3. Biomass – uses, creation and recovery in the ELP

Building on the "urban forest use" platform in the ELP (MUNLV / PROJEKT RUHR (2005)) – which is being pursued by the Environment Ministry of North-Rhine Westphalia – an overview was made of the activities related to wood use in the ELP, which has been expanded to include uses of biomass. Whereby, it has been shown that a variety of activities and actors are already operating in this field. The utilisation of wood and wood products for energy production is already widely established. That's why the development and availability of optimal logistics in this region is of interest for the ELP. With the collaboration of the various actors a special field of biomass utilisation – the production of energy crops – will be further researched. The following points will be handled and examined in detail:

- Building of a wood yard, a wood-based CHP and a short rotation coppice on the premises of the former Lohberg coal mine in Dinslaken on the western edge of the ELP – being handled by the Ministry of the Environment and Conservation, Agriculture and Consumer Protection of the State of North Rhine-Westphalia, Wald und Holz NRW, MGG/DSK (Deutsche Steinkohle AG) and the city of Dinslaken ("urban forest use" platform in the ELP)

- Development of the former Hugo coal mine in Gelsenkirchen Buer, construction of a biomass power station with various technical components, installation of a short rotation coppice on the former coal mine of approx. 30 ha – being handled by MGG/DSK, with the support of the city of Gelsenkirchen and the MDV

- Planning of further research proposals/projects about biomass utilisation in the ELP through the MDV project together with the Frauenhofer Institutes Umsicht, Oberhausen and Logio, Dortmund, the MGG/DSK and the RVR

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8.3 Geovirtual Urban Environments as Media for the Communication of Information related to Managing Urban Land

Lutz Ross, Birgit Kleinschmit, Jürgen Döllner, Anselm Kegel

ABSTRACT

This contribution outlines a research project targeting at the utilization of virtual 3D city models in the context of urban land management. It explains the projects background and the research concept as well as basic methods, which will be applied during the project runtime. The project will build upon findings in environmental and urban planning, computer graphics science, and geoinformation science; it contributes to a German research framework (REFINA) aiming at the development of guidelines, best practice examples, and tools for the reduction of land consumption.

Introduction

Managing urban land requires dealing with complex ecological, economical and social needs, which in general are related to spatial structures and phenomena. In order to fit these needs, state of the art management strategies make use of information technology such as Geographic Information Systems (GIS), internet-based information services, 3D visualizations, and simulations to support decision-making and improve the communication fluxes between authorities, citizens and companies.

Geovirtual environments (GeoVE) are computer-generated depictions of our common environment, which are based on geoinformation and can be operated in real-time. Thus, they offer an intuitive, innovative, and challenging media to interactively explore, analyse and present spatial information in its three dimensional context. Typical occurrences of GeoVE are virtual 3D city models, which are increasingly established as one part of modern spatial data infrastructures (SDI).

The project "Land Information Systems based on 3D-City Models" ("Flächeninformationssysteme auf Basis virtueller 3D-Stadtmodelle) is a joint venture of the Hasso-Plattner-Institut Potsdam, Berlin Technical University, and 3DGeo GmbH. It aims at developing an information and communication system for land management on the basis of geovirtual environments. More specifically it addresses the development of techniques, tools and methods needed to successfully deploy virtual 3D city models for decision support in the context of urban land management. It builds upon existing virtual 3D city models and technology (Fig. 1) and high expertise of the partners with the set up and utilization of GeoVE in the context of urban and environmental planning, real

estate management, and consultancy of investors.

Figure 1: Official 3D city model of Berlin with thematic coloured buildings (Source: Senatsverwaltung für Wirtschaft, Technologie und Frauen 2006)

Four case studies in the Berlin and Potsdam area will be conducted in close cooperation with regional and local authorities and other stakeholders to identify potentials and restrictions. During the studies decisive parameter and geoinformation related to the specific management tasks have to be identified, integrated into the model database, processed, and visualized. The cooperation with authorities, the choice of prominent and sensitive urban development areas for the case studies, and participation during planning processes ensures a problem-oriented approach.

Background

The project is part of the German research framework REFINA, which is funded by the federal ministry of education and science. The aim is to develop methods, tools, and guidelines to reduce the consumption of previously undeveloped land by housing, industry, and transportation networks.

Key strategies for the reduction of land consumption are land recycling, inner city redensification, and the adoption of sustainable land management concepts by administration departments. During the recent years much effort has been made to develop sustainable land-management concepts and decision support tools (e.g. the project "Regeneration of European Sites in Cities and Urban Environments" – RESCUE: www.rescue-europe.com/html/project.html; or the project "Integriertes Management und Revitalisierung der Brachflächen" – Integra Sites: www.um.katowice.pl/strony/integrasites/de/) as well as to formulate best-practice guidelines (e.g. LfU 2003a & LfU 2003b). The results of the research activities show that the sheer amount of data involved and the complexity of land recycling tasks as well as the multi-stakeholder perspective often complicate urban land management. As a solution often a set of methods and techniques is proposed or combined. These incorporate among others GIS, 3D visualizations, public participation methods, and assessment methods to value economic, ecologic as well as socio-demographic aspects of land management.

Since land management is per se spatial, GIS obviously offer an appropriate technique to support land management and decision-making. At present GIS-based brownfield cadastre and empty-site cadastre are used in many municipalities to support the management, assessment and regeneration of brownfields or to allocate suitable sites for potential investors. Besides GIS, 3D visualizations are commonly used in participation processes regarding brownfield regeneration and urban planning. They support the cognition of the spatial impacts of proposed projects or policies on the visual landscape, respectively cityscape. Public participation methods such as 'round tables', stakeholder meetings, or incorporation of the public during planning phases are methods to access multi-stakeholder planning issues. If they are well prepared, these techniques can lead to better acceptance of plans. Participation processes often make use of GIS and 3D visualizations regularly to provide information and visual input. Assessment methods finally

provide basic methodologies to value land management related issues. They are the 'every-day tools' planners apply in planning processes.

The project partners expect that by combining and integrating these techniques under the metaphor of virtual 3D cities, innovative information systems can be realized which on the one hand provide real-time 3D visualizations, features for digital participation, and features for data exploration and analyses.

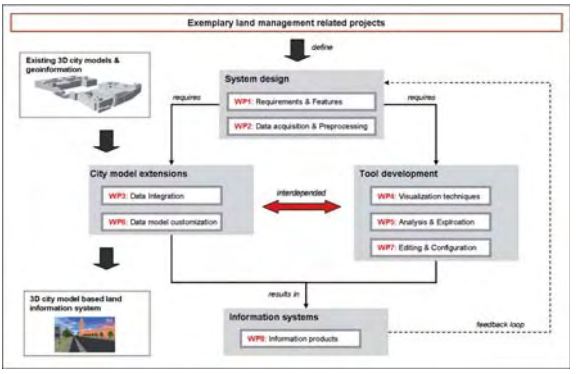

Figure 2: Overview on the research project and the main work packages (WP).

Research Concept and Methods

The principle questions include: How can information related to land management be integrated into virtual 3D city models? Which tools for analysis and evaluation of land situations can be implemented using the 3D city model? Which information can be communicated by means of the 3D city models? And what are the benefits and potentials of using 3D city models? Attempts to solve these questions satisfactory result in the conclusion that they can be answered only in the context of the specific application domain. While in the context of finding a suitable site for a potential investor factors such as the size of the site, the land-clearing costs, socio-demographic information on the neighbourhood, and the situation in terms of traffic routes can be of primary interest, public participation during planning phases may call for different requirements such as realistic 3D visualizations or interactive features for modification of plans to involve participants. For this reason domain specific requirements have to be taken into close consideration during system design, which provides the framework for the following work (Fig. 2). The following sections describe the main work packages (WP) in detail.

System Design

The design of the 3D city model system has to be extended by additional classes, attributes, methods, and relations to adapt the 3D city model to the needs of land-information management. Based on the extended system design, task-specific 3D analysis, presentation, simulation, and exploration tools can be developed. Since they rely on the available data, a strong correlation between data model and tools has to be ensured. Requirement analysis and design of features will be accomplished in close cooperation with local authorities and potential users for each use case. This step encompasses identification of project-related (geo-)information, definition of features or tools to support the defined management tasks, concepts of data integration, and clarification of data access rights.

City Model Extensions

Data modelling and data integration represent crucial steps for the success of the project. Basically three possibilities for data modelling and integration are considered:

a. Direct integration of georeferenced data and geodata in the GeoVE.

b. Embedding data into city model objects.

c. Integration of pre-processed data.

In case (a) we integrate georeferenced data and spatial data, e.g., given in vector or raster formats, directly as information layers into the GeoVE. Examples are thematic data sets or topographic data, which can be visualized as textures of the digital terrain model.

In case (b), we embed thematic data in the GeoVE by means of attributes provided by the objects that constitute the virtual 3D city model. This method is used for data that can be related to individual city model objects. The attributes can be evaluated and interpreted for the 3D tools and for 3D presentation purposes. Therefore, we will extend the underlying data model, including systematic definitions of required attributes, attribute domains and strategies for missing information to ensure a consistent and stable model schema on which the planned tools can operate.

In case (c) we facilitate the aggregation of data from various data sources and scales: thematic and geometric pre-processing is needed to combine these data sets to useful information. For example one feature might be a tool to visualize the traffic situation. Base data might be public transportation networks and stations, street networks, and walking times. To present an overall traffic situation these data sets have to be combined. One possible solution might be to define a cell size as basic spatial unit and calculate a 'traffic situation indicator' for each cell. As a result the traffic situation could be displayed as a height field used as terrain model, where the terrain height is an indicator for the traffic density.

Tool Development

After formulating application scenarios and a wish list of supporting features, the implementation of software tools can be started parallel to constructing the data basis and data integration. Three categories of tools are in our focus:

- Tools for exploration and analysis,
- Tools for editing and configuration, and
- Visualization techniques.

The development of land management supporting features will be based on an iterative and incremental software development model. This ensures that shortly after the project start an initial system is available, which can be incrementally refined. In this way, feedback and proposals can early be integrated and risks in the software development process are reduced. The following sub sections outline these categories.

Tools for Exploration & Analysis

This work package encompasses the development of techniques for the analysis of site respectively land plot properties. It includes basic techniques to assess and visualize land management related parameters such as economic situation, environmental qualities, urban planning parameters, or other domain specific parameters. The 'traffic situation indicator' terrain would be such an application.

Another example represents a tool that processes development plans, generating principal 3D building models based on planning parameters. Thus, the abstract information of 2D development plans can be transformed into a 3D scenario. This approach supports people without planning background and helps them visualize and understand development plans and their implications.

Editing & Configuration

This work package addresses one major drawback of many existing (geo-)virtual environments. In general, most virtual environments are based on static models. Although the technical progress during the recent years led to impressive and detailed virtual 3D city models, which can be viewed and navigated in real-time, interactive editing or other interactive features are often limited or not available at all. Through the use of object-based program-

ming techniques it is possible to assign geometric and visual properties to the 3D objects, which can be edited in real time (cp. Buchholz et al 2006, Döllner et al. 2005). To stick to the earlier mentioned example such parameter might be the site occupancy index describing the maximum area that can be occupied when constructing a building. By defining this parameter in the data model and adding an interface that enables users to interactively redefining it, the system can be used to process scenarios where the site occupancy is utilized to different degrees.

Visualization Techniques

We also focus on visualization techniques, combining insights and methods from cartography, planning and geovisualization. To follow the previous example, imagine the system would be configured to calculate abstract 3D building models from development plans and configuration parameter. How should this information be visualized appropriate? If the same visualization techniques used for the existing buildings in the city model would be applied, recognition of the uncertainty of this information, the scenario character, would be neglected. A possible solution may be to use colours for thematic visualization, which is an accepted method in 2D cartography. But would that support an intuitive recognition of the information, or would be other solutions, such as the use of transparency or non-photorealistic rendering techniques more appropriate? Which approach is best suitable for the visual communication of specific information, can only be assessed by user feedback and evaluation. Thus the incremental software developing approach and the close cooperation with potential future users is important for the outcome of the project, as it ensures early feedback.

Information Systems

The case studies will result in four prototypic information systems, each designed to address specific management tasks. These information systems will be based on official virtual 3D city models, basic geoinformation and thematic geoinformation. To ensure the utilization of the information systems as well as to transfer them to users outside the administration in case of public participation, information products will be built from the source systems. Therefore, the relevant information has to be identified, extracted from the database and converted into products, which can be provided to users via DVD products or web services. To ensure the usability of the resulting products it is necessary to define interaction and navigation settings as well as to assure the proper use by digital rights management. Furthermore, a feedback option has to be implemented to allow for collecting statements, critics, and proposals from the users.

Summary

Because of the spatial background of land management it seems obvious that geovirtual environments provide a high potential as media for the presentation of information related to urban land management. Existing applications, e.g., the virtual 3D city models used at the Buisness Location Center Berlin and at the urban development department of Berlin (cp. Figure 1), already show that they can be utilized for planning and management tasks. Still these applications are very limited with respect to geo-processing and interactivity.

The outlined research project aims at uncovering potentials of 3D city models for land management by developing and providing domain specific functions for land management and decision support. It will provide working examples and prototypic information systems based on the case studies. It will be built upon state-of-the art geovisualization techniques, existing 3D city models and best practice examples for land management. It therefore combines recent findings in IT system engineering, computer graphics, urban and environmental planning, and geoinformation science. Through the

close cooperation with local and regional authorities as well as through the planned software development strategy, a domain-specific and problem oriented approach is ensured.

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8.4 Development of a Participative Evaluation and Decision-Making Procedure for Sustainable Land Use Management in Rural Areas

Birgit Böhm, Olaf Krawczyk, Tania Meyer-Glubrecht et al.

ABSTRACT

Within the scope of the BMBF research funding priority „REFINA" the 'Transparent Conversion' project idea was created. Objective is the development of a participative evaluation and decision-making procedure for sustainable land use management in rural areas. It exemplifies selected model regions with conversion sites and contributes to the '30-ha-per-day' target as well as to the requirement for information, participation and cooperation in sustainable municipal development planning. This is implemented by regarding socio-economic aspects, relevant environmental factors and contamination situation on the conversion sites. Basic data are collected, processed, analysed and evaluated to identify influencing factors. The complete process is communicated through an open, participative conversion procedure. Research results are an integrative evaluation and decision-making procedure for civil use of military sites, recommendations for action, creation of awareness in population, nationwide communication, a practical application tool with related database, intense exchange of experience, exploitation of synergy effects and an information centre.

Introduction

Land use for residential and transport purposes continues unabated and unchecked in Germany. The increasing use of land causes not only ecological and urban planning problems but is also - in the light of slackening economic growth rates, limited public financial resources and stagnating population growth - increasingly seldom efficient. Reduction of land use is therefore a central task of sustainability policy in Germany.

The '30-hectare target' set by the Federal Government and the Sustainability Council, to be implemented by the year 2020, aims for more sparing intelligent and sustainable use of land as a resource in urban and rural areas and this means that new guidelines for spatial development and a political rethink will be necessary. Although recent years have seen diverse statutory regulations in German land use and spatial planning legislation extended to cover aspects of sustainable land use it is to be feared that the '30-hectare target' will not be achieved with the available instruments and current urban planning procedures. The present check in the rise in annual land use is, according to expert opinion, to a not inconsiderable extent traceable to the economic slack period of

Figure 1: Aerial photograph of the barracks on the investigated military area

the last few years.

For this reason, in 2004 the BMBF identified one of its research funding priorities as 'Research on Reducing Land Use and Sustainable Land Use management (REFINA)', intended to support the precautionary principle by promoting research projects looking at innovative model concepts and evaluation approaches, along with new information and communication structures.

The REFINA-funded 'Transparent Conversion' project looks at two abandoned military bases in rural areas to rethink land development policies in the selected local authorities and to activate the principle of 'Sustainable Land use management' for municipal development planning.

Background

Land use in rural areas reached above-average proportions in the past especially through the generous designation of housing land. Additionally, more than a few cities and local authorities attempt to compensate for their disadvantages as business locations – despite financial strictures – with extra designation of commercial zones. This has led to a surplus of commercial land in regions which were mainly rural in character. The objective of resource-saving settlement development was thus thwarted by competition between local authorities and could not be attained by conventional regional planning approaches and traditional planning methods. Structural reform of the German Armed Forces and the departure of foreign troops leading to the abandonment of military facilities mainly affected rural communities, which found themselves confronted with exceptional challenges and problems.

Under the aspect of resource-saving land use, rural authorities are lacking decision-making instruments that would evaluate the type of post-use of the conversion areas as an alternative to the available land quota for the various types of use, considering the economic added value (also in a trans-regional context), the need for ecological protection and the social acceptability of a proposal.

Basic Idea of the Research Project

The overall objective is to devise an integrative evaluation and decision-making procedure that will make a contribution to sustainable municipal land use management. Taking the problems presented by these 'conversion areas', through a development process that was participative from the very start, post-use scenarios are assessed according to sustainability aspects. The aim of the decision-making and evaluation procedure is to determine, with participation by both local and regional stakeholders and residents, the optimal subsequent use(s) of the 'conversion property' for future land-saving settlement development at the location. For this reason the procedures in the research phase and also later in the implementation phase are embedded in a municipal development planning process. In this way, taking into account the guidelines to be devised, the consequences to be investigated and the obstacles that could arise from applying sustainable land use strategies, not only conducive but also restrictive factors can be considered and solutions sought. The procedure is to be documented and assessed for its strengths and weaknesses to create a basis for transferability, both to other locations and to other types of wasteland, especially industrial wasteland.

Project Association and Sub-projects

The research project includes representatives and experts from the fields of social sciences, economics and environmental protection along with local authorities, each of which has a sub-project allotted to them.

Sub-project 1: Coordination and Reference Location – Joint Community Barnstorf

Sub-project 2: Comparison Location – Joint Community Fürstenau

Sub-project 3: Communications and Participative Liaison - mensch und region GbR (MuR)

Sub-project 4: Environmental Factors – Mull und Partner Ingenieurgesellschaft mbH (M&P)

Sub-project 5: Regional Economy, Regional Planning - Lower Saxony Institute of Economic Research e.V. (NIW)

Sub-Project 1 - Coordination and Reference Location, Joint Community Barnstorf

Devising the procedure was to use a 'Reference Location', with particular attention paid to the conversion area.

The Reference Location, the joint community Barnstorf (pop. 12,100) is situated in the administrative district of Diepholz between Osnabrück and Bremen in North Germany.

While population growth in recent years has been around the national average, both manufacturing industry and the services sector have been growing at above-average rates. At the end of 2005 the 'Hülsmeyer-Kaserne' closed, a military facility which comprises an area of approx. 20 ha with exceptionally modern buildings.

Figure 2: Barracks of the "Hülsmeyerkaserne" in the joint community Barnstorf

Figure 3:
Technical facilities on the "Hülsmeyer - Kaserne"

After the German Army had left the employment situation became even more critical when the most important local employer, a mineral oil and natural gas processing company, moved to another location. The former site of this firm presented considerable potential for conflict on planning issues because of its location within the town.

Sub-Project 2 – Comparison Location, Joint Community Fürstenau

To achieve transferability of the procedures to general statements on the factors for success and obstacles to a participative land use management process, the findings at the reference location will be checked for weaknesses at the comparison location and published. This comparison location is, both in its population and in its rural location (distance from primary centres of population, transport connections) generally comparable with Barnstorf. On the other hand the conversion areas at this location have clear differences in their natural features, land uses, state of planning and connections with the town structures. Thus the transferability of the findings to other regions can be guaranteed without losing sight of the location-specific characteristics.

The comparison location, joint community Fürstenau with a population of around 16,700 lies in the North-west of administrative district Osnabrück away from im-

portant transregional transport axes. As a mainly residential location with a comparatively low concentration of jobs and, for the district Osnabrück, an above-average number of commuters, since German unification it has seen an above-average increase in housing construction, mainly detached houses for one or two families with the resultant high land use.

Intended abandonment of the German army facility in Fürstenau (the 'Pommernkaserne', covering 29 ha and a 270 ha comprising surrounding training area) which employs almost 900 people is one result of the 'Struck-Liste' (drawn up by the former Federal Minister of Defence Peter Struck) of military bases to be closed. This means that the district authority will soon have to cope with a serious loss of jobs and local purchasing power.

Sub-Project 3 - Communications and Participative Liaison

Most of this sub-project is prepared and implemented by mensch und region, Böhm, Kleine-Limberg GbR. mensch und region investigates the spatial perceptions and related meanings that the people they questioned attach to the areas, and specifically scrutinises the significance of information, cooperation and involvement for local residents in the course of the evaluation and decision-making procedures with respect to the prominence of sustainability factors in coming to a decision. The survey supports the search for methodological procedures that are particularly helpful for municipal decision-making on sparing land use, especially in the informal sphere, and ways of connecting them with formal planning procedures and incentive schemes such as 'municipal finances'. With respect to the conversion projects, process patterns are mainly described and verified between the compared locations, and obstacles to sustainable land use management are identified, to derive strategic action guidelines and procedures from the information acquired.

The vision statement of cross-disciplinary and participative work markedly improves the quality and public acceptance of usable findings, so that they can and should be applied, in adapted form, to other land conversion projects.

Sub-Project 4 – Environmental Factors

Mull und Partner Ingenieurgesellschaft mbH addresses all the ecological and environmental aspects of the project and is responsible for investigating and considering the soil and groundwater protection dimensions. One focus is on including and applying qualitative and quantitative soil protection aspects in spatial planning law, as often the requirements of land saving are not sufficiently considered and it is important to assign them a stronger role in future planning decision making procedures. By the same token, the standardised assessment of soil functions – especially those of soils heavily affected by human use – is a much-discussed issue in planning procedures and is included in the considerations of this research project. Along with comprehensive data research full surveys of soils and biotope types are executed, which lead to a concluding assessment and explication of the factors to be considered in the decision-making and evaluation procedure.

Investigations at the military bases of possible soil and groundwater contamination is another focus of this sub-project. The conversion of military properties presents a many-layered planning and change-of-use process with a large group of stakeholders, all of which creates exceptional challenges not only for public institutions but for all those involved. A basis for the decision-making process on post-use is provided by a status report derived from historical research into inherited contamination, making possible a reconstruction of the history of the site's uses with particular attention to possible contaminants in the soil and the groundwater. Investigations include time-lapse aerial photograph evaluation, evaluation of historical and current plans and specialist maps,

and collecting contemporary eye witness accounts. The formal evaluation, conforming to public legal requirements (e.g. German Federal Soil Protection Act and Ordinance) is available, so that initially a conventional hazard analysis according to legal regulations can be made.

All the spatial baseline and subsequent data collected witjin the scope of the research project is fed into a GIS-supported database devised and administered by M&P, which also contains the analysis and visual presentation of the geodata.

Sub-Project 5 – Regional Economy and Regional Planning

The Lower Saxony Institute of Economic Research is working on the regional economic and planning issues raised by the project. The specialist input consists of ascertaining and generating socio-economic indicators to draw up a profile of the investigated area, to determine strengths and weaknesses, opportunities and problems and to deduce future development trends.

The statistical and empirical findings are to be combined with partial results of the other project association partners in a development vision statement on the 'how' and 'where' of future potential needs for land use, and constitute the basis for a decision-making and evaluation procedure for sustainable municipal land use management. The conversion area offers, in a sense, the occasion to rethink municipal land use policy and take account of sustainable development aspects and the needs of the public at large. It constitutes a priority measure to be developed in a realigned municipal land use policy. From a scientific point of view it is important in this procedure that the findings reflect the current state of research and to learn from examples of Good Practice. Concurrently, a debate should be conducted on the effects and effectiveness of instruments in striving for the objectives and alternative instruments considered .

Project Structure

The research project, which started in spring 2006 and is running for three years is divided into various work packages. The diagram below shows a simplified sequence of the 'Transparent Conversion' project.

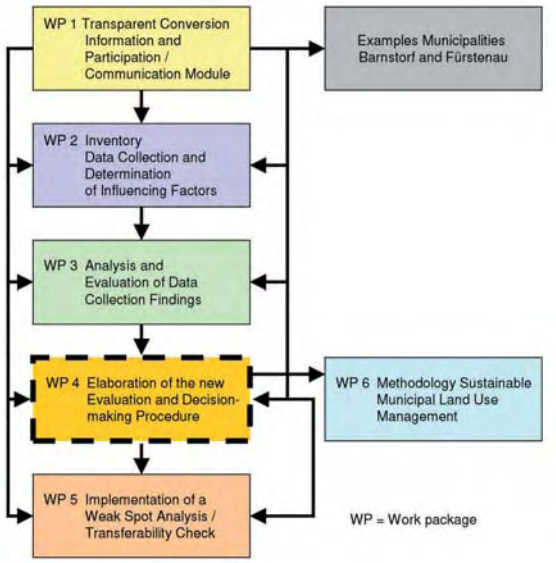

Figure 4: Flowchart of the research project

Work Package 1 – Transparent Conversion

An information, communications and cooperation process should be developed that transcends hierarchies and sectors, designed to promote the active involvement of local residents and disseminators with decision-makers in the conversion and land use management process. In the course of the research project investigations look at whether and, if so, to what extent participative procedures generate more sustainable land use decisions, and what possibilities exist of standardising the

participative process to facilitate transferability of experiences, procedures and methods to other processes. The products of this work package are an agreed communications concept, a website with a learning tool and a local information centre as contact point for the public.

Work Package 2 – Inventory

This work package aims to extrapolate influencing factors and document them with the help of a database. To this end a socio-economic, ecological, regional economic and political inventory must be made and data, attitudes, and value systems in the local community analysed. The work package will produce recommendations on the selection of primary influencing factors, an agreed database concept and an exemplary test run of the database.

Work Package 3 – Analysis and Evaluation of Influencing Factors

The aim is to evaluate the data, information and maps collected in WP 2 under the particular aspect of their influence on weighting and decision-making about land use and land use management. The products are the evaluated analyses of a concluding workshop (the client group to be determined by the association) and a report on the core cycles of influence for local participative evaluation and decision-making.

Work Package 4 – Elaboration of the Participative Evaluation and Decision-making Procedure

Based on the results from WP 3, the participative evaluation and decision-making procedure will be devised and set up, aiming to present the influencing factors on and conflicts of interests arising from use options for various areas, considering the issues of sustainable land use and land saving potential in the form of a matrix with the participation of all process stakeholders. The experiences and findings of all association partners and the results of the workshop are brought together to construct a procedure. The stages of the work will be carried out by the entire project group with varying intensity according to stage. Products of this work package are the completed participative evaluation and decision-making procedure with the appendant report on the evaluation matrix.

Work Package 5 – Analysis of Weak Spots

The aim is to identify weak spots of and obstacles to applying a participative evaluation and decision-making procedure and where possible to remove them or to model and/or adjust the procedure accordingly. The work stages of WP 5 will be carried out by all association partners at varying intensities in different periods. Products of this work package are recommendations on applying the procedures, to be documented in a concluding workshop and report.

Work Package 6 – Methodology for Sustainable Municipal Land Use Management

Work package 6 aims to communicate the applicability of the devised procedure to sustainable municipal land use management to all stakeholders and interested parties in the fields of science/research, officials/administrators/local government and the population at large through documentation and targeted presentation of results and findings. Product of this work package is the tested transferability of the procedure, to be documented in a concluding workshop and report.

The stages of the work will be carried out by the entire project group, according to stage, at varying intensities.

Applied Research

A need for applied research exists especially in cross-disciplinary and informal procedural approaches in land use management, to coordinate efficient participation and the linking of all relevant re-

gional players. This approach responds on the one hand to the demand for a broad social consensus and sufficient awareness of the problems involved in responsible use of land as a resource. On the other hand, the specifications of environmental quality standards and recommendations for ongoing land monitoring and management processes are easier to devise. On the whole, research on enabling and facilitating the application of integrated decision-making and evaluation procedures for sustainable land use management is under-represented, and explicitly applications-related research is needed to complement existing research projects.

Implementation of decision-making and evaluation procedures within day-to-day municipal planning procedures should be ensured through collaboration between the local authorities and the project supervisory board. The need for such a procedure in municipal land use management may be deduced solely from current developments, with increasing demand for building on hitherto undeveloped land and an increase in the decommissioning and abandonment of built areas on military and commercial sites.

Utilization Plan

The main thrust of the research association's endeavours is to devise a participative evaluation and decision-making procedure for sustainable land use management in rural areas. Potential synergy effects, especially in the fields of soil protection, land use management, conversion and management strategies/sustainability management and participation, will be included, derived both from practical experience at the locations and also from consideration of current research activities and exchanges with other institutions and scientists.

The research association is thus equipped to provide municipalities with an exemplary decision-making instrument that can evaluate the type of post-utilisation of 'conversion areas' as a sensible alternative to the available designated development land for various use types. The economic added value (also in a trans-regional context), the ecological protection requirements and public acceptance are all included in the process.

Research Findings

The research findings and products, including a local information centre, a website, a learning tool, a GIS-supported database and recommendations on procedure and actions, are to be realised in the communities of Barnstorf and Fürstenau. Furthermore, they should flow into the updated planning aids for developing conversion areas and revitalisation of wasteland, accessible to all interested professionals at national and state level.

From an economic point of view, optimising the planning process and above all the planning results, an optimised use of municipal resources is expected coherently. Inappropriate allocations of municipal financial and personnel resources in land and infrastructure planning are thus averted. Added value will be created for the participating institutions and enterprises through application of the research findings in a diversified and qualitatively improved service offer.

Conclusions

What is primarily needed to combat development sprawl also in rural areas is a change in attitude in the population at large and planning officers and agencies in a habitat in which, apparently, there is plenty of space. Sustainable municipal land use management should be embedded in a municipal development strategy, to harmonise land potential to the actual need and practical municipal objectives, and concurrently ensure the best possible interplay between stakeholders and planning and development instruments.

Through the 'Transparent Conversion' project, by considering social, economic as well as ecological framework condi-

tions, a holistic/integrated examination of conversion is carried out at a location that, because of its rural situation, presents exceptional conditions for applying land use management instruments. The active collaboration of the affected local authorities in the research association and the praxis-oriented and extremely cross-disciplinary composition of the project team, made up of experts from various fields of study, make it highly likely that a sustainable and practicable solution of the problem will be found.

8.5 Land Use Management by Innovative Regional Planning – FLAIR project

Dirk Engelke, Wolfgang Jung, Thomas Kiwitt, Torsten Beck, Walter Schönwandt

ABSTRACT

The project FLAIR introduces a problem based approach in regional governance and planning and proposes an update of the traditional instrument of so called regional plan.

FLAIR does not start with methods, instruments or theories to reduce land claims but with the query of spatial conflicts as starting point. This approach of ‚Problems-First-Planning' includes interviews with experts to identify complex spatial problems and conflicts as well as experiences on land use management in Switzerland, the Netherlands and France.

Local Brownfield potentials are surveyed qualitatively and quantitatively in ten communities of the Region of Southern Upper River Rhine. Two so called strategic planning procedures will be done in order to develop strategies how to activate Brownfield potentials and reduce the consumption of open land.

The FLAIR approach intends to provide more adequate strategies of high political and practical relevance and furthermore stimulate an update of regional planning tools and an innovative land use management.

Introduction

The research project „Land Use Management by Innovative Regional Planning", called FLAIR by the German acronym, is a joint project by the „Regionalverband Südlicher Oberrhein", the body by public law responsible for regional planning in the Region Southern Upper River Rhine the Institute for the Foundations of Planning at the University of Stuttgart and pakora.net – network for towns and regions, a private consultant at Karlsruhe.

Our „Model Region", which is among the wealthier regions within Germany, is the Region of Southern Upper River Rhine, located along the River Rhine which is also the border to France. The Region has about 1 million inhabitants, who are unequally spread across the Region. There is a strong disparity of a growing, prosperous and densely populated West in the valley of the river Rhine and the Black Forest in the East, with smaller settlements, a more rural population and tendencies of shrinkage of towns.

To cover these different tendencies and developments within the region, we have ten partaking communities where a survey of Brownfield potentials will take place, as well as strategic planning procedures, to which will referred later on.

Looking at the main tasks and challenges, the question is how to sustain prosperity and economic growth in the region as a whole. Because of demographic changes this aspect will get more and more important in the future: while there's on the one hand an overall increase of population forecasted, population will shrink in the nearer or further future. Moreover, this increase affects the region on a whole, but there will be shrinking parts, especially in more rural areas of the Black Forest. But demographic change will also mean

a tremendous aging of population, i.e. an increase of older, retired people and a decrease of younger and/or employed people.

Furthermore the polarity of a concentrated West and rural areas in the East demand differentiated approaches of how to manage growth and decline at the same time and often very close to each other. For some of the partaking communities this will lead to a shortage of land to be claimed for settlement and traffic uses, while others have and oversupply and vacancies especially in the town centres, while land claims at the periphery goes on.

What will be one major task in the future is the significant increase in traffic especially along the Rhine. Traffic, in particular of goods, is forecasted to increase tremendously, especially when the tunnels through the Alps -Lötschberg and Gotthard in Switzerland- will be finished. This will demand additional traffic infrastructure in the means of railways and highways –the autobahn- along the Rhine – with all its problems of noise, emissions etc. and last but not least funding.

Problems first

Referring to Brownfields, we hence have to deal with a whole bundle of problems relevant for spatial planning. Not only that there is a high number of problems and planning tasks, but also those problems are to a high degree complex, i.e. they are extensive linked with each other, in-transparent, inter-disciplinary and dynamic on their own. Question is whether spatial planning has the capacity to handle these complex problems – and a lot of people say, it doesn't. Thus, it's relevance for an integrated land use management is doubted.

Regarding spatial planning and regional planning we often have to deal with criticism:

- It does not deal with tasks concerning everyday life's problems and concerns of the citizen.
- It is not relevant to politics.
- Spatial planning is not effective enough and it's capacity of governance is too small.
- It does not deal with the complexity of spatial problems.
- It is a bureaucratic regulatory routine.
- Scientific discourse is often very abstract and there is no real connecting between theory and practice.
- In particular regional planning and it's traditional instrument, the regional plan, is „caught between two stools", that means, it has to handle this criticism, while outcomes on the local scale for managing land claims are small.

In addition to this negative external assessment also "internal" problems have to be tackled: The governance and spatial coordination of settlement development – one of the major objectives of physical planning – remains insufficient.

This can be traced back to an – at least in parts - inadequate methodical approach for the allocation of relevant spatial functions. Furthermore, the transmittance of regional planning objectives into the more detailed planning documents on community level fails frequently. Thus, the essential integration of content and legal impact of planning documents on regional and local level is deficient.

Especially referring to the criticism of not being relevant to citizens and politics, one might say this is due to political and financial circumstances. FLAIR wants to change our point of view and our way of planning: If we concentrate on the problems we want to solve, we nearly automatically get relevant to politics. Furthermore, solutions are more adequate.

A quotation of Ackoff shows the right direction: „We fail more often because we solve the wrong problem than because we get the wrong solution to the right problem." And normally we have the tendency not to take a close look onto the problems, but to solve „the wrong" problem instead.

But very often instead of looking at the problems to be solved planners start with (see Schönwandt and Jung 2006):

- Solutions
- Methods or instruments
- Aims to be achieved
- Theories we know
- Or procedures of planning processes.

All of this aspects are important and cannot be missed in spatial planning, but it is not guaranteed, even not likely, that we can solve the problems, if we don't take them as starting point. As Goethe puts it: „Who misses the first buttonhole, is not able to button up." That means: we cannot get a consistent planning process from the problem to the solution, if we miss the definition of the problem.

Hence, we have to take a different approach to planning and land use management into account. The FLAIR approach can be described as ‚problems first'. Within the FLAIR project, three different and parallel layers are undertaken:

- The setting of problems, which are an overall framework of further developments in the region,
- The communities' characteristics and demands in particular regarding Brownfields,
- And reference cases from other countries like the Netherlands, France and Switzerland (see figure 1 Research design - Layers of analysis).

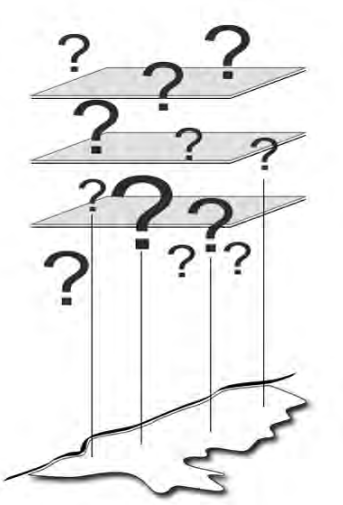

Figure 1: Research design - Layers of analysis

Setting of the problems

The FLAIR project sets the problems –as complex spatial tasks- as starting point. The main task is here, that there are not fix, obvious problems but they are relevant and given to different points of view. Problem-Setting and what we call the forward and backward shift of the problem are the keywords here. Important for the research design are the developments and tendencies, which „hit the ground" (Sassen), which are relevant to space and land use respectively land use claims.

So in a first step different ‚levels' are analysed, like health (e.g. health infrastructure and locations of hospitals, the trend from cure treatment (funded by the state) to wellness…), traffic, demography, social infrastructure and so on, and spatial relevant changes and developments sought.

Additionally, not only changes within but also changes in-between theses levels are analysed. For example: due to demographic changes the number of pupils will decrease in the future. This will affect schools in particular in rural areas where some locations of schools might be shut down. As these pupils are a great portion of the users of public transport in rural

areas, this will affect public transport as well.

The results of this query –the identification of complex spatial problems– will be discussed in workshops with experts on spatial planning, traffic or administration as well as with politicians and local stakeholders.

In addition to the setting of the problems the communities' characteristics and demands focus on the local problems on the community level. The overall aim is to excerpt a problem based solution on a medium level, right between the frame setting level of problems and the local characteristics on the community level. This medium level is the level of regional planning, strong enough to face the superior level and strongly based of the community level.

Communities' characteristics and demands

For focusing the communities' characteristics and demands FLAIR builds up an overview on potentials and conflicts as a tool for land use management. Not only to show the potentials, also to display conflicts (and solution) to activating locations for a re-use.

The conflict overview is a main part of this overview, because Brownfield potentials are mostly a kind of "theoretical potentials". They are fragmented and spread all over the community, belong to private owners and by that they are at the edge of the range of traditional planning instruments. Especially if the economic situation of the private owners is weak or other private reasons lead to a low interest of investing money.

To display potentials and conflict the overview focuses on two levels:

- On the macro-level the overview contains information like: the municipality's vision and their economic situation, demographic situation, budget of the municipality and the entries in most deficit a.s.o.
- On the micro-level of the single location it contains information like: traditional location information (position, size a.s.o.), unused or less used space or buildings, spaces in economic transmission (farming from main to sideline) and buildings in demographic transmission where only people live who are older than 70 years.

The overview on potentials and conflicts is based on a mixture of statistic facts, specific information of the location and political (so in the end personal) assessment. It allocates "hard data" and "soft assessments" to create a common shared view. This assessment of the situation or so called "Lagebeurteilung" (Scholl) considers results from the frame setting layer and the local characteristics in order to widen up the solution space from a local project approach to a land use management by innovative regional planning.

To survey the potentials and conflicts and come to the assessment of the situation the overview is done in five steps:

1. Local characteristics: Surveying local characteristics on the macro-level and build up trust and awareness.
2. Detailed location survey and overview: Survey on the micro-level of the single location and create an overview out of the detailed information.
3. Cross-checking by "the independent third": The outside-look on the potentials, are there any unnamed potentials or potentials out of mind?
4. Feedback: Giving feedback and create a joint view on the problem.
5. Build up a political strategy: Help the local politicians to start a discussion and build up a political strategy - and fixing - towards sustainable land use management.

The last step of the survey is a first step into realisation. For that the overview of detailed location information is clustered in "danger zones" and "hot spots", in witch parts of the community to concentrate on and where to not to concentrate on. Besides the clustering on the local level FLAIR is focusing on clustering on a thematic level. What are local characteristics, what are regional characteristics and what can be done on the regional level to support the local level in land use management?

Reference cases

The requirement to transmit planning objectives from a supra-local to a more detailed local planning level is evident in all multi-level systems of physical planning. Hence should be examined how other institutions deal with this task and – if present – the aforementioned instrumental and methodical problems.

To achieve an sufficient input not only planning institutions of other regions but also in different German Länder (each with specific planning regulations) as well as in the neighbouring countries of France, Switzerland and the Netherlands are analysed.

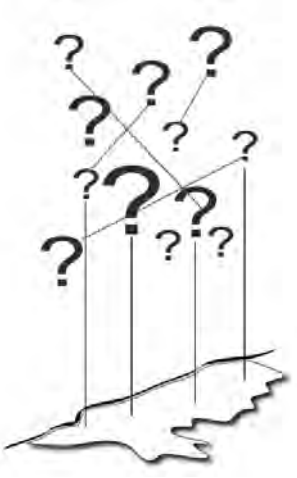

Figure 2:
Problems first - Raising the right questions

These observations on the instruments, planning processes and political agendas are the best practices and the core for an knowledge exchange on Land Use Management by Innovative Regional Planning.

Regarding to Ackoff FLAIR will face the "right problems" and raise the "right" questions by the help of and the 'problems first' approach and the three described layers (setting of problems, communities' characteristics and demands and reference cases). See figure 2: Problems first – Raising the right questions.

Activating potentials by ‚strategic planning procedures'

By the query of spatial conflicts, reference cases and community analyses, the FLAIR partners want to „ask the right questions", using problem-based approach rather than dealing with "the usual suspects" (Capitaine Louis Renault in "Casablanca"), and identifying the main complex spatial problems of our model region.

By the help of the potential and conflict overviews in exemplarily communities in a quantitative and qualitative way in ten communities of the region this will be the input for ‚strategic planning procedures'

‚Strategic planning procedures' are a sort of mixture between architectural competitions, which are aimed to have a big variety of solutions for a problem, and expertises, where mainly one solution is developed very detailed.

‚Strategic planning procedures' can be used for complex, long-during planning processes, not for everyday routine. They demand different organisational conditions like:

- Create temporary a planning organisation, consisting of an interdisciplinary task force, which meets regularly apart of daily routine.
- Work on different problem levels and planning scales.

- Build teams (usually three) to compete against each other in a „contest of ideas".
- Work in a defined rhythm.

Within FLAIR two so called strategic planning procedures will be done, with three planning teams in each procedure in order to have what you can call a contest of ideas and to develop strategies how to activate Brownfield potentials and reduce the consumption of Greenfields.

The outcomes of these strategic planning procedures are aimed to prove their feasibility of their implementation and to test their transferability to other communities and regions.

The outcome of these strategic planning procedures cannot be used like „copy and paste", but for every planning task, every community and region, we have to use a different mixture of instruments.

As shown in figure 3 answers and relevant links are found by the help of the described strategic planning procedures. They pierce through the frame setting layer and the communities' characteristics and demands at solutions for a certain problem.

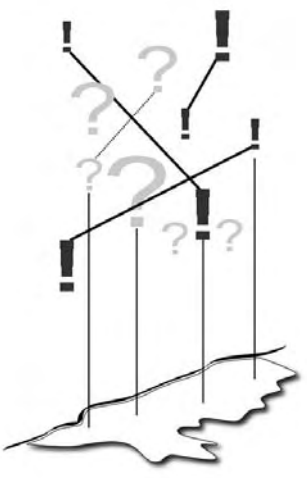

Figure 3:
Pilot planning - Answers and relevant links

Conclusions

The FLAIR project offers a different approach to spatial planning: not the methods, instruments or theories are starting point for how to reduce land claims but puts the spatial problems – as complex spatial planning tasks – in focus. So FLAIR introduces a problem based approach in regional governance and planning and proposes an update of the traditional instrument of so called regional plan.

Interviews with experts and experiences on land use management in Switzerland, the Netherlands and France as well as the qualitatively and quantitatively survey of local Brownfield potentials in ten communities of the Region of Southern Upper River Rhine are used to develop a joined view onto conflicts relevant to spatial planning and land use.

Two so called strategic planning procedures will be done in order to develop strategies how to activate Brownfield potentials and reduce the consumption of open land.

The FLAIR approach intends to provide more adequate strategies of high political and practical relevance and furthermore stimulate an update of regional planning tools and an innovative land use management.

As a result an improvement of the methodical approaches used within the planning process on regional level is expected. Furthermore the transmission of these objectives into the land-use plans on community level should be strengthened and – if necessary – be supplemented by additional, informal but flexible instrument to safeguard sustainable development within the region.

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8.6 SMC DEVELOP SMS – Small and medium-sized Companies develop small and medium-sized sites – A REFINA-Project in the city of Stuttgart

Volker Schrenk, Jantje Samtleben, Jürgen Braun

ABSTRACT

The REFINA-project "SMC develop SMS" is concentrating on the development of small and medium-sized sites (SMS, area size < 5 hectares) by small and medium-sized companies (SMC). The significance of those sites for inner-city redevelopment was demonstrated as main result of the project "Sustainable Building Site Management in Stuttgart (NBS)". The reuse of SMS can make a significant contribution to the reduction of greenfield consumption. However, there are also some problems which need to be mentioned, e.g. structural development limitations, contaminations. In addition, the town council has to coordinate the different stakeholders and has to act in a flexible way. For those reasons, site revitalization is often time-consuming. However, SMS represent an optimal project size for SMC. Based on the conditions mentioned, the objectives of the project are e.g. the development of a standardized management concept for local administrations, which implements standardized interaction procedures with SMC; the improvement and broadening of concepts of SMC for the development of SMS. This concept will be tested at model sites.

Introduction

In the field of brownfield redevelopment, efforts are often focussed on large areas in inner-city locations. The significance of small and medium-sized sites (SMS) with an area size up to 5 ha, has not been recognized yet by most municipalities – not least because there is no inventory of these sites in most municipalities. The relevance of those SMS for inner-city redevelopment has been demonstrated in the research project „Sustainable Building Site Management in Stuttgart" (Beck et al. 2003), which was funded by the federal state of Baden-Württemberg. The results of the project show that small brownfields, which have been largely neglected so far, make up a considerable area resource in Stuttgart. Using this potential would contribute significantly to the reduction of greenfield consumption. A similar situation might be expected in other European cities.

A rapid revitalization of small and medium-sized sites is very intricate and problematic. Difficulties are caused for instance because of unclear property rights, contaminations and limitations concerning structural development. Therefore, the revitalization of these sites makes large demands on the local administration and requires more flexible approaches than are in use currently.

For this reason, the redevelopment of small sites could be a target for small and medium-sized companies – so-called SMC.

A fundamental aim of the research project described in this article is the development of new strategies for local administrations and companies (SMC) concerning the revitalization of small and medium-sized sites (SMS) with an area size up to

5 ha. By increasing the reuse of SMS, a reduction of greenfield consumption can be achieved. The project is funded within the budget of the BMBF research program REFINA (Research for the Reduction of Greenfields Consumption and Sustainable Site Management, see Wittmann et al. 2006).

Initial situation

Condition for a reuse of small sites is an inventory of underused sites in urban areas. In the city of Stuttgart, these were researched within the scope of the project "Sustainable Building Site Management in Stuttgart (NBS)", which was carried out from 2002 to 2004. The main components of the project NBS were

- Registration of existing underused sites in need of redevelopment,
- Build-up of a comprehensive information platform
- Formulation of possible strategies for the local administrations (Krieger & Schmid 2006).

For the research project, more than 350 areas with potential building sites were registered. The total capacity of the sites is about 500 ha area and 5.5 Mio. m² floor space, respectively. Numerous small and medium-sized sites make up the largest part of the area available for inner-city redevelopment in Stuttgart. 173 locations with a size up to 1 ha and 118 locations with a size up to 5 ha are concerned. Those sites make up 95% of the entire area available and 65 % of brownfield land (Figure 1). In total, the identified inner-city redevelopment potential would be sufficient to satisfy the area demand in Stuttgart over the next 10 to 15 years.

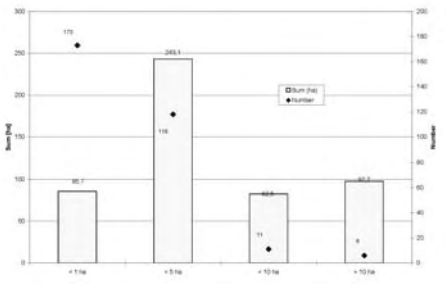

Figure 1: Sum of building sites depending on the area size and number of locations (Beck et al. 2003)

All registered locations were filed in an internet-based information platform for the town administration, including the most important site specifications, aerial photographs and maps. Based on this platform, the publicly accessible website www.stuttgart-bauflaechen.de was created. The locations are characterised by the addition of photos, maps and by the following parameters:

- "Location (description)",
- "Traffic situation",
- "Real estate",
- "Owner",
- "Current use",
- "Legal situation (land utilization plan)",
- "Future use",
- "Further information (contact persons)"

The use of SMS is going to be important particularly for booming regions, as they form an underused potential for inner-city redevelopment. But even in regions with shrinking population, attempts to reuse small urban brownfield sites will be useful in order to avoid a decline in attractiveness for the districts concerned.

The project „SMC develop SMS“

Aims of the project

Aims of the REFINA research project “SMC develop SMS“ are:

1. The development and implementation of a management strategy for local administrations in order to encourage the development of small and medium-sized sites (SMS). The concept includes for instance a continuous supervision of SMS by location/area management and an improvement of activity coordination between municipal authorities. As a part of this project, instruments for the selection of promising areas are developed, where revitalization could be carried out in a short period of time. By this, the optimum point in time for municipal initiatives can be determined and the status of development reached for a particular area can be ensured and documented. The administration effort should be kept at a minimum by developing standardized approaches and routines. This makes a continuous supervision of SMS possible.

2. The development of a SMC strategy for the handling of brownfield land. For these companies, business approaches are developed and courses of action are recommended in order to make it possible to use the development of SMS as a (new) business segment and to work closely together with municipalities and property owners.

3. The development and testing of concepts for the communication between municipality, medium-sized investors and developers as well as owners or on-site companies, respectively. These stakeholders should be permanently involved in the process of redevelopment. For the motivation of stakeholders, special promotion approaches were developed by the city of Stuttgart in order to create incentives. These are going to be tested in practice during this project. Furthermore, concepts for the marketing of sites are developed, which should help communities with the search for investors.

4. The developed strategies will be tested at model sites and will therefore be used at specially selected locations in Stuttgart. This means they undergo a comprehensive practice test. The management strategy designed is going to be revised by use of the Delphi method. Thus the practical feasibility of the developed methods and the transferability of the approaches to other municipalities is ensured.

5. Advanced training and application of results. Another aim of the project is the application of results in practice in form of education modules for municipal authorities and SMC. Advanced training is going to be offered as compact short-term modules in several locations in order to establish the findings widely. Additionally, recommendations for all involved stakeholders, including SMC, and political demands are going to be formulated.

The participants

Local administrations as well as universities and engineering consultants (SMC) are involved in this project. These are in detail:

- Research Facility for Subsurface Remediation (VEGAS), University of Stuttgart (http://www. vegasinfo. de). VEGAS is the coordinator of the project as well.
- University of Biberach (http://www. fh-biberach.de)
- City of Stuttgart (http://www.stuttgart.de)

- Ingenieurgesellschaft für Umwelttechnik und Bauwesen Dr. Eisele mbH, Rottenburg (http://www.dr-eisele.de)
- reconsite – TTI GmbH, Stuttgart (http://www.reconsite.com) as contractor of VEGAS.
- b e c k - c o n s u l t . d e , Berghausen (http://www.beck-consult.de)
- KOMMA.PLAN, Munich (http://www.kommaplan.de)

The research is carried out in Stuttgart. As a consequence, numerous departments of the city of Stuttgart are involved in the project; for instance the Department for City Planning and Redevelopment, the Department for Business Promotion and the Department for Environment Protection. The local administrations are lead-managed by the Department for Urban Development and the Environment.

Additionally, several other municipalities participate in the project as cooperation partners. Among these are the cities of Darmstadt and Cologne. These municipalities provide research data and information. In return, the results of the project will be presented and discussed with those municipalities. Furthermore, developed tools will be made available to them.

Work packages

The work plan of the project incorporates three phases (Figure 2) with comprehensive work packages. The transitions between the single phases are smooth, so that some work packages can be processed across phases.

The project was approved during in the autumn of 2006, so that currently the work packages of phase I are processed. At the moment, no concrete results are available for the different work packages, so that only the status of work will be described shortly in connection with the introduction of the different work packages.

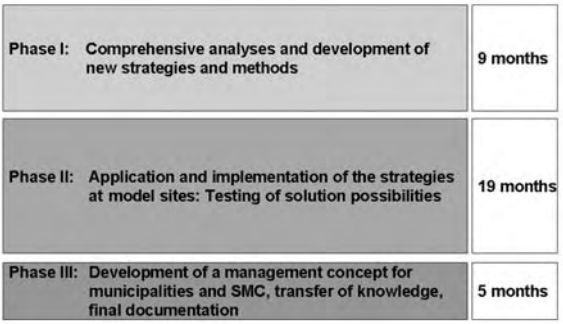

Figure 2:
Phases of the project and the scheduled running time

PHASE I: Analyses and development of new strategies and methods

In this phase, a comprehensive, interdisciplinary analysis of the reuse of small and medium-sized sites is carried out by examining ongoing and completed projects on those locations. The analysis is supplemented by a questioning of all stakeholders that are involved in the projects, particularly the SMC. Based on the results of the analyses, new action options and strategies for local administrations and SMC are developed. These will be incorporated into the management concept that is being developed for SMC and local administrations and that will undergo a comprehensive practice test at the model locations in phase II.

Work packages of phase I

Analysis of potentials and development of small and medium-sized sites

Within this work package, an analysis of completed (failed and successful) redevelopment projects of SMS over the last years in Stuttgart is carried out. The analysis is focussed on obstacles and problems experienced during the redevelopment process. Data collection is carried out in close coordination with the city of Stuttgart. Previous experience shows that it is difficult to establish contacts with the persons involved in failed projects. Furthermore, the

existence of SMS potentials is researched in selected cooperating municipalities as well.

Analysis of the strategies employed by stakeholders: small and medium-sized companies – SMC

A comprehensive data collection and analysis concerning the strategies employed by SMC for the redevelopment of small and medium-sized sites is carried out. The approaches of different SMC for the development of sites are compared to the approaches of larger companies such as LEG (Landesentwicklungsgesellschaft) as well. In coordination with the project partners, a questioning concept has been developed so far.

Analysis of the behaviour of owners

Very often, site owners play an important role for the realization of a redevelopment project at SMS. They decide whether their site will be redeveloped at all. In order to understand the strategic aims and the considerations of site owners better, their behaviour and their expectations will be analyzed.

Analysis of boundary conditions

Within this work package, the following topics will be discussed:

- What kinds of experience have SMC with cooperative planning approaches?
- Which demands are made by financers on a SMC during the redevelopment of a SMS?
- What kind of education modules are offered for municipalities in this field?

Analysis of completed deconstruction projects and existing planning instruments for the dismantling of buildings

Through the analysis of completed deconstruction projects, cost dominating activities during the dismantling process are identified in order to file them in future precisely in a database. Existing planning instruments are analyzed, taking into account project experiences, and are checked with regard to their suitability for further development in order to further final redevelopment aims.

Evaluation tool for site selection

In order to select interesting sites from the existing pool of sites suitable for redevelopment, an evaluation tool is going to be developed. The basis of this tool has been already developed. The tool allows for a priorization during the selection of sites, so that for instance areas suitable for a quick reuse can be identified. For this aim, a list of criteria was compiled and an evaluation procedure was developed, so that sites can be assessed according to their potential for different types of reuse. For the development of this tool, the points of view of the municipality and of investors have been taken into account as well.

Fundament of the approach is a so-called "site potential passport".

The first version of the approach developed by reconsite is going to be developed further in cooperation with the project partners and is going to be applied for the selection of pilot locations later.

Site management

In order to realize investment decisions quickly, investors want "a competent contact partner within the public administration". This will be made possible by developing a site management concept including an information platform (GM-Tool), which provides fundamental information for investors, owners and public administration. The aim is to improve communication between the stakeholders involved and thereby to improve the chances for a successful implementation of redevelopment.

Municipal promotion program

Experience shows, that organisational measures alone are not sufficient for the reactivation of critical sites. Therefore, the step from planning to implementation will be facilitated with the help of a promotion program. The aim is to motivate owners to consider an adequate use of their site and to take measures in order to ensure this. Therefore the determination of suitable incentives to initiate the favored urban development process for unfavourable site constellations is going to be necessary.

Marketing guidelines

Within this work package, a guideline for the marketing of SMS and for the encouragement of SMC to work on SMS, is going to be developed. This guideline should for instance introduce the user to several different possibilities for the marketing of sites and should support him during the choice of a suitable marketing instrument.

Possibilities of internet contribution for the activation/marketing of SMS

Currently, basic approaches for the utilization of new media for marketing of estates are in use. However, a systematic description of the possibilities of use is still missing. As results of the evaluation, conclusions about the possibilities of internet use are expected.

Economic aspects of SMS development

The economic value of revitalization of SMS has been neglected in investigations so far: Economical returns from the development of SMS are not known. For this reason, the monetary value reused SMS have for the budget of a municipality, or the amount of cost savings for the municipality due to the reuse of small areas, is not known.

In order to close these knowledge gaps, a comprehensive analysis of the economic consequences caused by SMS reuse is carried out. The aim is the development of a motivation for site revitalization from an economic point of view. The collection of economic data would support the use of SMS and supply political decision makers with arguments for an increased reuse of SMS.

Development and optimization of a planning instrument for building deconstruction using computerized support

Within this project, computerized support planning instruments are developed in three consecutive steps. They are going to be used in the fields of deconstruction and refurbishment of buildings without contaminated materials, buildings contaminated due to construction materials used and buildings contaminated due to construction materials used as well as due to building uses.

SMC strategy

Based on the results of analyses as well as on the expertise of the engineering company Dr. Eisele, recommendations for medium-sized companies are developed. They should be enabled to develop their own strategies for the reactivation of SMS. Focus of the recommendations will be necessary qualifications for the SMC as well as cooperation with municipalities, particularly concerning funding possibilities.

<u>PHASE II: Application and implementation of the strategies at pilot locations - Testing of solution possibilities</u>

The strategies newly developed in phase I are going to be applied in this phase on pilot locations in Stuttgart. For this, model projects for every site category given in the research project "Sustainable Building Site Management Stuttgart (NBS)" are going to be selected. Subsequently, the methods and strategies developed in Phase I of the project are going to be tested at a minimum of three locations each. The locations to be chosen should represent different problem types. This means that the developed methods and strategies

can be tested under differing boundary conditions and can be further developed accordingly. During the identification of suitable sites, the strategies developed in phase I can be already tested. A preliminary selection of sites was already carried out as an important step during phase I of the project.

The instruments will be employed over a longer period of time at the selected sites. The experience gained will be used for the improvement of the tested instruments.

Work packages of phase II:

Transparent project development

Following the evaluation of preselected sites, three particularly suitable locations are going to be scientifically accompanied during the process of redevelopment, ideally until the monetary evaluation of the reactivated site. Players in the process of redevelopment are still municipalities, possible investors, owners and other stakeholders usually involved with a brownfield redevelopment project.

In order to ensure appropriate scientific monitoring, a project logbook is maintained. For this, the involved stakeholders are analysed as to their motivations and options of action at all decisive milestones during project development. The results are evaluated and documented, possible useful or harmful interactions between the actors are exposed. Alternative strategies are assessed or developed additionally in the course of transparent project development.

Furthermore, sensitive information can be put on record in order to analyze it at a later point, when the project development won't be influenced or endangered by the assessment. By using this approach, the necessary transparency of all processes can be ensured.

Implementation of cooperative planning procedures

For two of the selected locations, cooperative instruments suitable for steering further project steps are going to be selected. The aim of this procedure is to develop market-oriented future use concepts. The planning consultant beck-consult.de take on the role of a „third party" during preparation, process and evaluation, in order to moderate impartially between the stakeholders involved: project developers who want to maximise their profit, owners who want to maximise the value of their estate and municipalities with "romantic social concepts" of urban planning.

Implementation of marketing guideline

The guideline is employed at all pilot locations, in order to gain experience about its use in practice. Furthermore, the marketing guideline is going to be made available to the cooperating cities for the implementation of recommendations.

Economical aspects

Based on data supplied from the municipality and from the project developer at a specific location, the fiscal and value effects are demonstrated for the model sites in Stuttgart. With this approach, the model developed in phase I is reviewed and improved, if necessary. Based on the experiences, a motivation guideline is developed.

Implementation of site management and municipal promotion program

The developed promotion program is aimed at the motivation of site owners and investors; they should be encouraged to consider a suitable use of their sites together with the local administration and to act accordingly. At the same time, the instruments and methods developed are used in the process of site management.

PHASE III: Development of a management concept for municipalities and SMC, transfer of knowledge, final documentation

In this last phase of the project, the results and experiences gained with the new strategies and tools, which were tested and further developed in PHASE II, are evaluated by means of the Delphi method in order to show the transferability of results to other municipalities in principle. The tested new strategies for the handling of SMS are compiled; subsequently, two management concepts are developed from this basis, oriented towards two target audiences: One for local administration in order to allow an optimized handling of SMS in future, the other for SMC, in order to improve their abilities for the revitalization of SMS. For a fast establishment of the project results in practice, an advanced training concept for municipalities and SMC is developed in order to introduce the developed tools in professional circles and to ensure a rapid knowledge transfer to the practice.

Work packages of Phase III

Realization of the Delphi method

The method is used for revising and amplifying/generalizing the methods and the connected management strategies. All the results are compiled and a recommendation for the management strategies is developed.

Formulation of management strategies

Based on the practical experiences gathered as well as the Delphi method, the results of the project are compiled into a practical management concept for local administrations and SMC, respectively. For this, the results of the project are analyzed and compiled to management concepts for the local administration and the SMC in cooperation with all project partners.

Development of a concept for advanced training and education modules

The results of the project and the developed management concept are processed by the project partners and converted into a concept for advanced training and several different modules used for educational purposes by municipalities and SMC.

Timetable and current status of the project

The project was approved in the autumn of 2006 and has a duration of about 3 years. During the runtime, several workshops are planned in order to discuss current results with professional circles. A first internal workshop took place in March 2007, when the ongoing operations were introduced to representatives of the town council and other experts.

The first project steps are quite unspectacular and haven't resulted in essential or final results yet. However, these project steps are important and decisive for subsequent success. Current operations include the processing of the particular topics of phase I of the project. To these belong – as mentioned above – the compilation and analysis of reference projects, data processing and preparation of the political decision for the model sites, the development of an evaluation concept, the preparation of the analysis und conception of municipal promotion programs and finally the preparation and inventory for site management.

Current information about the project can be found online at the project website http://www.kmu-kmf.de.

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8.7 Sustainable land management in the city of Hannover - A private sector fund model to mobilise brownfields and reserve building land

Silke Kleinhückelkotten

ABSTRACT

The presentation is on the project ‚Sustainable land management in the city of Hannover' which is part of the REFINA programme. The project aims at developing a private sector fund model for mobilising brownfields and will explore its implementation conditions for the city of Hannover. It also will analyse the transfer conditions to other cities and regions.

The work is done in four working packages:

- **Improvement of the data and information on wasteland and reserve building land for the city of Hannover by a new digital information system**
- **Development of a private sector fund model**
- **Analysis of players and institutions in the urban planning process (in local authorities) and in the real estate market of the city of Hannover as well as in the funds market**
- **Examination of implementation conditions of the fund model in Hannover and of transfer conditions to other cities and regions**

Introduction

Sustainable land management aims at provid-ing a good quality of life for all citizens in addressing environmental, social, economic, health and cultural issues (Aalborg Commitments).

One important goal in urban areas is the prevention of suburban sprawl and the reduction of land consumption. A substantial instrument to reach this goal is the reuse of brownfields or wasteland.

Central spaces with highly developed infrastructure and low costs for revitalisation are usually easy to redevelop. But it is hard to mobilise less central spaces which are contaminated and cause high cleaning costs.

Many contaminated sites are in private ownership. Private owners normally have no interests, no skills or no capital to conduct brownfields restoration fraught with (financial) risk.

Public authorities are therefore highly involved in the brownfield restoration. They conduct the decontamination on their own sites, offer support for private investors e.g. in form of subsidies or tax advantages or enforce clean-up by statutory provisions. Each brownfield is an isolated case and and requires an adequate more or less expensive cleaning process. The process of revitalisation of sites fraught with risk often fails because of high costs and the remaining risks of contamination

With an integrated approach that involves several (contaminated) brownfields more sites could be developed as in an isolated approach because of a risk-prospects-balance between different decontaminations.

In order to mobilise contaminated sites

new economic instruments are necessary to mobilise private capital and give monetary incentives to brownfields restoration.

The project ‚Sustainable land management in the city of Hannover' aims at developing a private financing model to clean up and redevelop brown-fields, combining elements of closedend funds, project finance, and public private partnership (PPP). The implementation conditions are examined in the ‚test case' city of Hannover.

First positive experiences with PPP and project finance for brownfield restoration do exist (e.g. Tomerius et al. 2003) and can be used and further developed. Funds based private financing constructions mobilise private risk capital and know how, they are implemented in ship and film financing and are actually used for financial restructuring of credit, investment and estate portfolios. They are not yet applied for brownfields restoration and it is to check if they are a suitable instrument.

A Private Brownfield Fund

The underlying idea is: Several brownfields with different decontamination and development risks are put together in one closedend ‚brownfield fund'. They are to be cleaned up and sold according to the demand.

Private investors, the funds management and the earlier (public or private) owners carry the risks and share the gains of the portfolio sale.

Risks and prospects are divided between all participants according to their abilities and goals, so that – given the resources - in a certain period more sites can be cleaned up as possible with separate restorations.

Since private investors expect a certain rate of return, ways to achieve adequate profits and/or leverage private equity must be found. If only reached by high sales prices, this would restrict the application of the fund model to densely populated

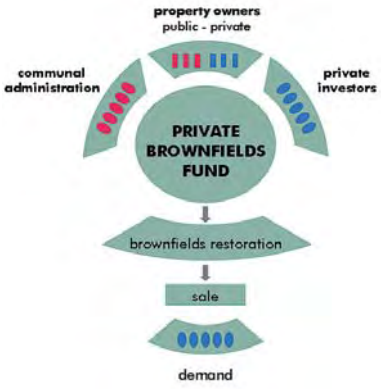

Figure 1:
Structure of a private brownfields fund

prosperous regions with development potential. The coverage of the restoring costs by the later utility value of the redeveloped site however is not necessary, if alternatively public funds are brought in or gains from a facilitation of the planning process can be realised.

‚Test Case': City of Hannover

Hannover is the regional capital of Lower Saxony in Germany with about 515.000 inhabitants. About 1.200.000 people are living in the greater Hannover region.

Main characteristics of the city:

- supraregional central functions: centre of industrial and service companies and worlds leading international fairs as well as cultural and educational offers
- various universities: high potential for research and development
- city of gardens: high quality in open spaces, parks and historical gardens

Main challenges for urban planning:

- remodelling or reconstruction of the city: to maintain and offer a high quality of living in Hannover especially for families and to prevent ur-

ban sprawl (especially towards the surrounding region)

- building and construction on recycled sites

The city of Hannover has long experience in urban land management on the basis of surveys on industry, military sites and reserve building land. In the last years the redevelopment and urban integration of several brownfields and military sites was managed (e.g. formerly industrially used sites like Ahrberg and Pelikan, and the Prinz-Albrecht-barracks). But there are still about 200 brownfields and sites of reserve building land that have to be redevelopped.

The role of the city of Hannover in the project is to link the fund idea with existing and enhanced planning approaches and instruments for sustainable settlement development and to check their efficiency. Therefore it is also necessary to assess regional steering instruments and forms of cooperation because they have an important influence on the urban development of Hannover.

Figure 2: CONTI Brownfield in Hannover

Project description

The project "Sustainable land management in the city of Hannover" is an integrated approach, participants from science and practice work together, in order to develop a private sector fund model for mobilising brownfields and to explore its implementation conditions in Hannover and beyond. The work is done in four working packages:

1. Improvement of the data and information on wasteland and reserve building land for the city of Hannover by a new digital information system, including assessment criteria for areas with regard to their importance for sustainable settlement development, a set of social, ecological and economic indicators to evaluate measures to promote sustainable urban development

2. Development of a private sector fund model, containing the designing of the organisational structure and the economic and legal analysis of risks as well as risk management strategies, e.g. performance-related contracts, contaminated land insurance, and PPP (for more details see the article by Lars Holstenkamp in this volume)

3. Analysis of players and institutions in the urban planning process and in the real estate market of Hannover as well as in the funds market in order to identify their interests on behalf of the fund implementation (like readiness to bring in brownfields or private capital respectively acquire and develop recycled sites)

4. Examination of implementation conditions of the fund model in Hannover and of transfer conditions to other cities and regions, by identifying suitable sites and interpreting the results of the the work packages 2 and 3

The results of the project will be a private sector fund model including statements to the conditions that are necessary for implementation in Hannover and / or beyond.

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8.8 Komreg - Local-Authority Land Management in a Regional Perspective – the Region of Freiburg

Matthias Buchert

ABSTRACT

By engaging in exemplary cooperation between scientists and practitioners (research institutes, planning consultancies, local authorities), the komreg project as part of the German Research Ministry's REFINA sustainable land management programme addresses the pivotal level at which a sustainable reduction of future land consumption can be implemented: the region. The Region of Freiburg (City of Freiburg im Breisgau, District of Emmendingen and District of Breisgau-Hochschwarzwald) is continuing to experience settlement pressure due to rising household numbers and a vigorous economy, and is thus prototypical of conurbations with high levels of economic growth. The project shall produce, for the first time, via potential analyses and model-based scenarios for simulating and controlling municipal and regional land and resource consumption, a robust decision-making base for the region and its municipalities, taking urban-rural interactions into account. This permits an assessment of future resource requirements (land, costs) in both inner-urban development and/or greenfield development (incl. regional-level inventory analyses and forecasts).

Introduction – the objectives for land management

Some years ago Germany's national Council for Sustainable Development began working on proposals for defining and continuously updating environmental targets and turning these into concrete project briefs addressing particular action areas. In spring 2002 the German federal government published a document entitled "Perspectives for Germany – Our strategy for sustainable development" which set out its position on the challenge of sustainable development. It included long-term targets for sustainable development in Germany with regard to raw-material and energy productivity, climate protection, the proportion of primary energy consumption supplied by renewable energy sources, and land use. The German federal government's environmental target for daily land-take for new settlement and transportation areas, with the year 2000 as the baseline year (approx. 129 ha/day), anticipates a reduction to around ¼ of the baseline figure (30 ha/day) by the year 2020 (German Federal Government, 2002). In the years 2001–2004 the daily land take dropped to a level of about 115 ha/day. Many ambitious and intelligent activities are thus still necessary to reach the government's target in 2020.

Without doubt the reduction of daily land-take means much more than just a matter of hectares. Meanwhile vacant property is a high priority on the housing agenda for the New Laender as well as some regions in the Old Laender (in former West Germany). Whole urban districts are under threat of decline and dereliction. Many municipalities are literally bleeding to death as their populations dwindle, while continuing to meet high infrastructure costs. On the other hand

there are regions in Germany (mainly in the south) which have economic growth, an increase of population and households and therefore demand for land for housing and commercial purposes. Nevertheless fundamental demographic changes like aging, dwindling household sizes etc. are under way in those regions, too.

Sustainable land management must take into account that the situation and development perspectives in the various regions of Germany are very different. Furthermore the reduction of daily land-take is a multi-sectoral task. The main objectives are the reduction of environmental pressures, the strengthening of socially intact communities, the revalorization of cities and municipalities and a contribution to sustainable economic development in the regions.

komreg objectives

The overall objective of the REFINA project **komreg** is to make a significant contribution to the national target for daily land-take by engaging in exemplary cooperation between 11 cities and municipalities and scientists in the Region of Freiburg as a prototype of a booming conurbation.

The detailed project objectives are as follows:

- Investigation of the built-up area potential in the 11 communities!
- Data capture concerning economic efficiency of inner-urban and green-field site development (potential for cost savings)!
- Development scenarios for the region!
- Improvement of inter-municipal and regional cooperation on urban development!
- Agreements on specific projects to be realized, and formulation of recommendations for these projects!

Region of Freiburg

The Region of Freiburg (City of Freiburg im Breisgau, District of Emmendingen and District of Breisgau-Hochschwarzwald) is located in the southwest of Baden-Württemberg, which in turn is the south-western Land of Germany (see figure). The Region of Freiburg borders the Rhine and France to the west, the District of Ortenaukreis to the north, and the Districts of Lörrach and Waldshut to the south. Switzerland is just 30 kilometres to the south. The eastern part of the region is within the southern Black Forest. The Region of Freiburg is part of the Southern Upper Rhine Regional Federation (Regionalverband Südlicher Oberrhein).

Figure 1: Region of Freiburg (in blue) in southwest Germany

From a topographic point of view the Region of Freiburg can be divided broadly into three landscapes: The Upper Rhine

Valley, the foothill zone and the High Black Forest with Großer Feldberg (1493 metres elevation). This division determines land management practice in the region, as the specific circumstances and possible conflicts must be taken into account. For instance, the steepness of areas in the uplands and the higher flooding risk (in the uplands and the plain) restrict development areas available for housing, industry and infrastructure.

The Region of Freiburg is an interesting example of a booming conurbation embedded in an attractive pattern of landscapes. The University of Freiburg, a robust base of small and medium-sized companies (the solar energy branch is well-represented, for instance), a vibrant gastronomy and tourism sector and a stronghold of agriculture and wine-growing are just some of the key aspects of this attractive region. As a result, the Region of Freiburg has experienced major growth in population: from 463,000 in 1970 to 547,000 in 1990, and further to 623,000 in 2005. These figures amount to an overall increase by 34.5% in just 35 years. This growth is much higher than the German average and higher than the average of Baden-Württemberg (+ 19.9% between 1970 and 2005).

The number of employed persons has also risen remarkably between 1975 and 2005 in the region: + 30.8% (Baden-Württemberg: + 14.3%). As a result of these facts, which reflect a booming development, the housing stock has grown on an extraordinary scale in the last decades: from 187,000 housing units in 1978 to 222,000 in 1990 and 277,000 in 2005. The rate of growth between 1978 and 2005 was 48.4% (Baden-Württemberg: + 37.0%; all figures from StaLa 2006).

Despite these developments of the last decades it should be underscored that the mainstream demographic developments of Germany like aging of the population, decrease of birth rates and decline of household members per household are foreseen for the Region of Freiburg, too. Various forecasts still predict rising figures (population etc.) in the next years. But the foreseeable demographic changes must be taken into account by local and regional authorities in their daily land management practice.

Against this backdrop the Region of Freiburg is clearly a very interesting location for the REFINA research project komreg, as sustainable land management must deal with a broad range of driving forces to succeed.

komreg partners

The REFINA project komreg is a cooperative venture involving Öko-Institut (Institute for Applied Ecology), Baader Konzept GmbH, the city administration of Freiburg im Breisgau and IfSR – Institut für Stadt- und Regionalentwicklung an der Hochschule Nürtingen-Geislingen together with the 10 representative neighbouring cities and municipalities in the Region of Freiburg: Municipality of Au, Municipality of Ballrechten-Dottingen, City of Breisach, City of Emmendingen, Municipality of Hartheim, City of Herbolzheim, Municipality of Merzhausen, Municipality of Schallstadt, City of Titisee-Neustadt, Municipality of Umkirch.

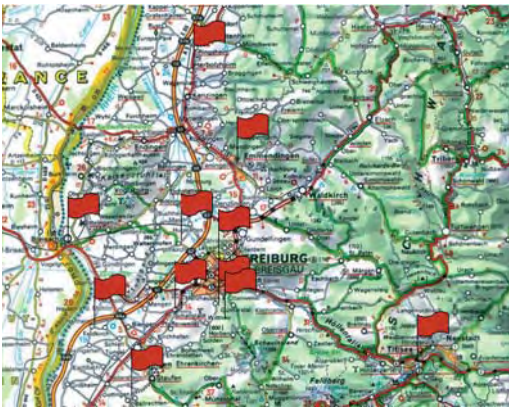

Figure 2: komreg partner communities inside Region of Freiburg

The following table gives an overview and some facts about the komreg partner communities.

Table 1: komreg partner cities and municipalities [Baader Konzept, 2007]

City / Municipality	Population	Structure of area (Regional plan 1995, LEP 2002)
Au	1,364	Agglomeration area
Merzhausen	4,615	Agglomeration area
Umkirch	5,308	Agglomeration area
Freiburg	215,966	Agglomeration area
Hartheim	4,553	Peripheral zone of agglomeration area
Schallstadt	5,827	Peripheral zone of agglomeration area
Herbolzheim	9,846	Peripheral zone of agglomeration area
Breisach	14,264	Peripheral zone of agglomeration area
Emmendingen	26,127	Peripheral zone of agglomeration area
Ballrechten – Dottingen	2,232	Rural area
Titisee - Neustadt	11,912	Rural area

komreg methodology

Overview

The innovative nature of the project stems from its unique combination of two novel tools at regional level. In selected municipalities within the region, the areas potentially available for inner-urban development shall be inventoried, this potential extrapolated to the entire region in consultation with regional actors, and the information thus gained used to create a range of development scenarios for the region. These scenarios will be debated and defined together with key regional and municipal actors. Using software tools developed by project participants, it is then possible to calculate, for instance, how much living space of different types (detached single-family housing, terraced housing etc.) could be developed in Freiburg and neighbouring municipalities through inner-urban development under a range of assumptions, and how much land will be needed for greenfield development. This will provide essential strategic information for the region's development. A dialogue process shall accompany the project, involving, besides planning and environmental aspects, an exploration of the economic impacts on cities and municipalities in the region that would follow from the scenarios.

The komreg project is currently in progress. The following work packages will be carried out until spring 2008:

Working phase 1: Investigation of the built-up area potential (inner-urban development) in the 11 partner cities and communities

Working phase 2: Data capture concerning housing stock and extrapolation of the local built-up area potentials for housing purposes to regional level

Working phase 3: Setting up and agreeing on development scenarios for the region

Working phase 4: Investigation of detailed scenario results regarding the development of housing stock (potential for inner-urban development and demand on greenfield sites)

Working phase 5: Data capture concerning economic efficiencies, highlighting potential savings

Working phase 6: Deduction of intermunicipal and regional strategies and priorities for concrete projects to be realized

Register of infill areas

The work on registers of infill areas for Freiburg im Breisgau and the other partner cities and municipalities is an important building block for the overall methodology. Most of the local authorities in Germany do not have suitable registers of infill areas: non-digital versions, registers with old data or even nothing at all. This means that mostly the small and medium-sized communities lack the information concerning the supply side that would be

necessary to engage in sustainable land management. Comprehensive knowledge of the total potential of free inner-urban areas and the use of modern software tools (GIS-systems) is an important requirement for local authorities to manage settlement development and reduce pressure on greenfield sites caused by new-build. Baader Konzept GmbH found in a former project in Bavaria that even the mayors of small municipalities greatly underestimate the potential of infill areas (Hensold et al, 2003).

Therefore the survey of the inner-urban potentials in the 10 partner cities and communities with modern tools (geographical information system, aerial photos, digital maps etc.) is an important part of the methodological approach of komreg. In the case of Freiburg im Breisgau, the city administration and Baader Konzept GmbH cooperated to renew the former register of infill areas. In all cities and municipalities the results of the survey are checked by fieldwork covering the overall settlement areas of the communities.

Figure 3: Photo of a typical infill potential

The examination of the overall infill areas for inner-urban development followed a rigorous structure:

- vacant plots
- land which is only developed to a low level
- brownfield sites
- abandoned farm sites

The result of the detailed register work is a 100% digitalized map for every partner community showing the different types of infill areas – in housing and industrial areas, too. Every community will gain a suitable database to use in their daily urban development work. The number of interesting areas and the resulting hectares are just the „theoretical" potential. In further working steps the komreg partners will investigate the „realistic" potential for housing purposes, the focus of the komreg project. Realistic potential means areas which could be activated within the next 15–25 years with a high probability. To reach this objective the komreg partners will be in intensive and continuous debate with the cities and municipalities and discuss this crucial point with other urban development experts from other REFINA projects etc. The result of this step will be secured by a workshop with administration members of the communities and experts.

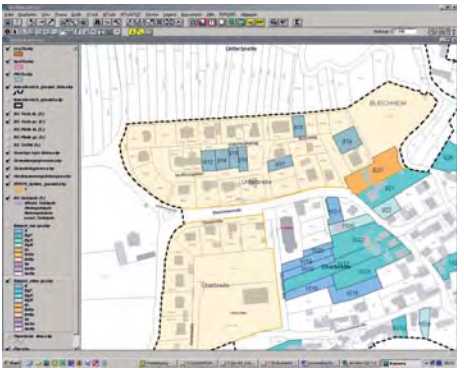

Figure 4: Screenshot register of infill areas

Scenario modelling

To address the demand side of sustainable land management it is important to gain detailed information about the population, the household patterns and the housing stock and estimations about the developments in the partner communities and the whole region. For data capture

Öko-Institut is evaluating all available data from statistics, prognoses and other valuable information. Interviews with experts in the authorities of the partner communities concerning their experiences and expectations, with a focus on the demand for new-build (number and housing type of new housing units until 2020 and 2030) are a very valuable way of gathering information.

A suitable IT-tool to simulate the demand side of housing regarding the objectives of komreg is available in the form of the BASiS-2 model developed by the Öko-Institut in a former project for the German Federal Environmental Agency, Buchert 2004. Using BASiS-2 it is possible to determine the trend in consumption of environmental resources including land-take attributable to the housing stock, over time, under various scenarios. The consumption of environmental resources is observed from the extraction of raw materials, through primary and secondary processing of base materials to use in construction of new housing units or in structural elements and building materials for conversion and maintenance projects; they are traced from purchase by the customer, through subsequent use to final disposal. BASiS-2 additionally takes account of the technical infrastructure necessary to provide access and services to residential areas (roads, utility supply and disposal systems).

Within the data capture work in komreg the average floor space index for detailed types of residential buildings (terraced house, semidetached house, single house for one family, single house for two families, different multi-family buildings) for every partner community will be investigated.

The floor space index is highly important for the extension of the model, since it provides the basis for calculating the access road/path area and the net site area (land for housing construction) for the purposes of the inventory. Since the access road/path provision (access area per m2 floor space) depends heavily on the specific floor space index, the floor space index is a significant leverage factor over land appropriation in the scenarios. For the purposes of the research project, the term 'access road/path area' subsumes the whole of the built publicly accessible areas within residential developments, i.e. residential streets and footpaths as well as roads. It does not include public green spaces.

The calculations with BASiS-2 allow a distinction between developments on greenfield sites and those in built-up areas. With these possibilities for differentiation on the infrastructure level, a strategic element has been created within the scenario-production process. The BASiS-2 can be used to test, for new-build housing, scenario assumptions that are differentiated according to spatial distribution (regeneration of urban sites versus use of new greenfield sites).

For the komreg project, scenarios for the next 15/25 years are foreseen. Scenarios will be created for the single partner communities and the whole Region of Freiburg as well. The scenarios for the single partner communities will be developed by the Öko-Institut based on the available data and prognoses, using support of the partners and after discussion with the authorities and administration of the municipalities. To gain the important input assumptions for the scenarios which should cover the whole region the komreg partners will organize and host an open project meeting. Representatives of all communities in the Region of Freiburg (about 75 including the partner cities and municipalities) and the Districts as well as selected other experts will be invited to explore the extrapolation step from the detailed data from the partner communities up to the whole region.

The results of the scenarios will deliver the cities and communities as well as the Region of Freiburg with a full package of detailed information about the differences between the supply side (inner-urban ar-

eas with realistic perspective for development concerning new housing areas) and demand side (area to satisfy the demand for new residential buildings), the potential of inner-urban new-build and the need for greenfield sites depending on the key leverage points of the scenarios.

Efficiency calculations

Economic efficiency will be a key issue in sustainable land management in the coming years. The dramatic experiences in the new (eastern) Laender with an excess of residential buildings and associated infrastructure (often realized in recent years with billions of euros in public and private investment) contrasted by a sharp decline in population have led an increasing number of experts to investigate the economic advantages and disadvantages of inner-urban versus greenfield development. Therefore the komreg partner IfSR is working on this issue together with the administrations of the communities. The objective is to gain a unique collection of first-hand data from the 11 partner cities and municipalities concerning different prototypes of inner-urban and greenfield site development respectively. Currently the experts of the partner cities and municipalities are listing detailed own data to address a standardized detailed questionnaire from the IfSR concerning investment costs, mid-term and long-term running costs etc. The komreg team will use the new data for discussions with the communities, identify special unique effects in single prototypes, discuss the economic efficiencies of the different options and draw conclusions of relevance for the scenarios and communication within the communities and the Region of Freiburg. It is foreseen to link the economic core data of the different options for inner-urban and greenfield development with the scenarios results concerning the housing sector.

Involvement of actors and communication

Continuous dialogue with the authorities and the experts inside the administrations of the partner cities and authorities as well as of the involved districts is a key point of the research project. Two workshops were carried out with contributions of all partner communities.

These activities went far beyond the basic aim of providing information about the research project and ensuring the smooth flow of information and data within the project. In order to ensure that current, well-founded information on the actual situation and on trends in the cities and municipalities sector are available to the research project, the different actors are systematically integrated into the individual project elements.

As a central platform for this process further expert workshops and large meetings will follow in the next months with the partner communities and many other actors of the Region of Freiburg as well as with selected other urban and spatial planners.

The scenario assumptions for the different scenarios will be discussed at length with the panel, and the assumptions derived on that basis will be decided together. An expert workshop will be held on special themes of particular relevance to the development of the scenarios.

By means of this communication structure it should be possible to integrate strands of the sustainable land use debate which had been pursued separately. Greater networking of actors and integration of the different sub-segments of the construction and housing sector proved to be an absolute necessity in order to achieve sustainable development in this activity area. The komreg project addresses the issues of sustainable construction and housing in Germany. At the same time, it focuses on sensitizing the different actors to the significance of the complex interrelationships and different perspectives within local and regional developments concerning housing.

Outlook

The komreg partners will stay in close contact with the REFINA family and other interested actors in the field of sustainable land management. komreg will be finalized in 2008. A brochure will be produced to summarize the project and its results regarding the main target group of local and regional key players (authorities etc.) and the scientific community respectively. A large final meeting will be organized by the komreg partners to exhibit and discuss the overall project results with the Region of Freiburg, to debate concrete further activities and to come to estimations about the possible transfer of the results to other comparable regions. Guests from other regions will be invited to this final meeting to support the dissemination of the komreg visions and results.

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Furthermore I owe a debt of gratitude to the administrations of the Districts of Emmendingen and Breisgau-Hochschwarzwald for key support in establishing contacts to the towns and municipalities, providing information about the region and engaging in ongoing technical debate. Special thanks go to Mr. Stefan Gloger (Environment Ministry of Baden-Württemberg) for continuous input and valuable discussions.

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8.9 E-learning for the Dissemination of Research Results

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ABSTRACT

Current or recently completed research projects regarding the topic of brownfield regeneration in Europe and Germany implied valuable outcomes in terms of sustainable developments. However, the results have not reached the end users of those recommended tools, i.e. stakeholders dealing with the management of brownfield redevelopment, so far. The German project WISSTRANS (Transfer of knowledge via innovative advanced training concepts for land recycling / land management) with its e-learning-platform "ELNAB" wants to apply at this point. Through face-to-face courses in combination with e-learning the transmission of these results to regional and local authorities as well as to private project developers dealing with the management of brownfield redevelopment will be realised. The paper argues that there is a demand for such an e-learning platform and presents the ideas of the project WISSTRANS.

Introduction

In recent years various research projects and networks regarding the topic of (sustainable) brownfield regeneration were implemented in Europe and Germany. These programmes developed valuable outcomes, which have the ability of being helpful on different levels of administration and project development to make brownfield redevelopment more sustainable. However, there is a lack of transmitting these results to the end users of those tools and recommendations, i.e. regional and local authorities and private project developers dealing with the management of brownfield redevelopment. A good solution to tackle this problem would be an acknowledged e-learning-platform, which serves as a medium for the results of different concluded projects. The German project WISSTRANS (Transfer of knowledge via innovative advanced training concepts for land recycling / land management) with its e-learning-platform ELNAB (e-learning for sustainable brownfield regeneration) applies exactly at this point.

WISSTRANS is a concerted project of ZEFIR – Zentrum für interdisziplinäre Ruhrgebietsforschung der Ruhr-Universität Bochum – and VEGAS - Institut für Wasserbau der Universität Stuttgart. These two partners will be supported by CiF e.V. - Kompetenzzentrum für Interdisziplinäres Flächenrecycling – and the Sachverständigen-Büro Dr. Thomas Ertel. The project is part of REFINA a new German brownfield research programme of the German Ministry for Research and Education. WISSTRANS is allocated to the REFINA focal point III: Development of new information and communication infrastructures.

Background

The e-learning-platform ELNAB is set against the identification of a threefold demand:

Demand for interdisciplinary training:

Brownfield recycling is a complex process which involves a wide range of skilled professionals from different fields. A substantial number and diversity of training courses are already available. However, these courses focus very narrowly on the special fields with brownfield recycling playing only a minor role or their focus lies only on technical aspects of brownfield recycling. In order to effectively and sustainably drive brownfield regeneration, a more cross-cutting education is needed (CABERNET 2005: p. 1).

Demand for „sustainability"-training:

Sustainable brownfield regeneration is a key factor for sustainable urban and regional development. For a long time the redevelopment of old industrial sites was generally indicated as sustainable. The preservation of greenfield sites through reusing brownfields was sufficient to be assessed as sustainable and resulted in many cases in getting public funding. However, the reuse of brownfield sites involves the risk of being unsustainable as well (Butzin & Noll 2005, p. 3). The projects on sites are often seen isolated from the spatial and social context. To realize the full potential brownfield regeneration offers for sustainable urban development, the parameters that influence the degree of sustainability within brownfield regeneration itself have to be understood (Glöckner et al. 2004). Brownfield regeneration can only be sustainable as long as "specific local human and social factors [...] in the planning process" (RESCUE 2005, p. 11) are considered. "A socially well balanced planning process, offering participation opportunities for all parties concerned, provides the necessary conditions for sustainability standards [...]" (RESCUE 2005, p. 11). The social and institutional aspects of sustainable brownfield regeneration have to be integrative parts of any teaching or training concerning brownfield regeneration.

Demand for networking and exchange of experiences:

In view of the various know-how and the manifold experiences in brownfield regeneration of the different stakeholders such as municipal and regional actors, consulting or engineering companies, land owners as well as universities it is an important step to encourage networking and exchange of experiences. This provides a basis to amend the effectiveness and the innovative ability of brownfield recycling.

The project

The project aims at the development and implementation of e-learning modules into practical advanced training courses. Thus, besides e-learning face-to-face courses will be implemented. Those advanced training courses will be developed including a modular concept based on a substantial market analysis and addressed to public authority, municipality and planning office members. The face-to-face courses will be offered initially in the three states North Rhine-Westphalia, Baden-Wuerttemberg and Saxony held as seminars and workshops.

E-learning for sustainable brownfield development (ELNAB) intends to develop and test innovative display formats of contents regarding sustainable brownfield regeneration via the Internet. This means the implementation of new methods and concepts of education in terms of sustainable land management. A comprehensive analysis of existing offers via the Internet and the present demand of target groups will be the basis. The e-learning courses are planned to be of advanced level.

Both advanced training concepts are clo-

sely linked together. One result is to get across the best available technology, state-specific problems, current European approaches just like findings and results of ongoing REFINA-projects in order to transfer and implement them prompt into practice. Since it is the objective of the presentations to carry forward the state of the art of knowledge, ongoing REFINA-projects will be analysed regarding their current and useful results. Adequate findings will be incorporated into the courses.

Indeed, up to now there is a lack of transmitting new findings to the end users of tools and recommendations useful for the management of sustainable brownfield regeneration. Several research projects have developed valuable outcomes, which are usually not recognized at local level yet. The Virtual Training Centre of the EU-funded research project RESCUE (Regeneration of European Sites in Cities and Urban Environments) within the 5th Framework programme is only one of many examples. It provides web based training packages for self tuition and use in face-to-face training. The VTC was developed from the outputs of RESCUE and is intended to disseminate the information obtained during the project (Manuel 2005, p. 222).

Currently available e-learning tools concerning brownfield development such as the VTC are on hand only in English and have deficiencies. These facts keep the target audience in Germany to make use of the tools. In addition, a European focus illustrates several topics more generally without interpretations and demonstrations of easily transferable best-practice examples.

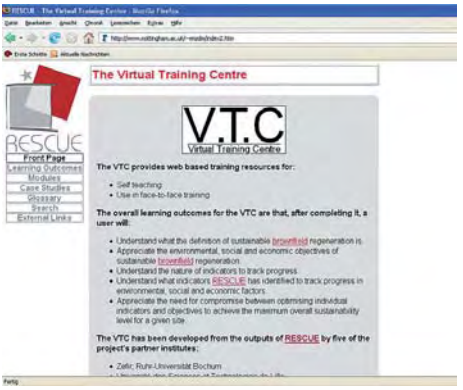

Figure 1:
The Virtual Training Centre (VTC) of RESCUE

Conclusions

In order to reach a more sustainable outcome within brownfield regeneration and make use of currently available research results a target orientated approach is needed in Germany. The focus needs to be on specifics of single states within Germany documented with best-practice examples. An acknowledged E-learning-platform has the continuing ability to serve as the provider for these information.

The project WISSTRANS (Transfer of knowledge via innovative advanced training concepts for land recycling / land management) with its e-learning-platform ELNAB is capable of meeting the requirements.

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9

Best Practice in Interreg

9.1

The REVIT Project

9.1.1 Objectives for Sustainable Brownfield Revitalization and the Challenges for Community Participation

Martin Franz, Kerstin Langer

ABSTRACT

This paper argues why sustainability approaches are needed for brownfield revitalization, how sustainable development can be measured, why community participation is needed and which are the challenges to master when participatory procedures are implemented. It provides an overview of important project phases. In particular it has a special focus on the question of how to design a workshop in which objectives and indicators should be discussed. The main challenges are the political and administrative integration of a participatory approach and its outcomes, an invitation procedure to reach the affected target groups, an adequate time-frame and programme to and a follow-up phase which observes at which stage additional dialogue offers may be crucial for a successful implementation of a sustainable development of an area.

Introduction

For a long time the revitalization of brownfield sites was generally regarded as sustainable. However, although the preservation of greenfield sites by reusing brownfields is indeed sustainable we argue that there are many forms of regeneration of brownfield sites, which are not sustainable (Butzin & Noll 2005: p. 3). In fact there is a need to define what makes brownfield regeneration sus-tainable. The EU-funded projects RESCUE (Regeneration of European Sites in Cities and Urban Environments) and REVIT (Towards more effective and sustainable Brownfield Revitalisation Policies) worked on different levels on this need: RESCUE developed a set of indicators and the so called Sustainability Assessment Tool (SAT) (Glöckner et al. 2004; Franz & Nathanail 2005; Franz et al. 2006), REVIT developed in Stuttgart a set of site specific indicators which were further developed in a participatory workshop (Langer et al. 2006a; Langer et al. 2006b). The topic was also discussed in the EPSRC funded network SUBRIM (Sustainable Urban Brownfield Regeneration: Integrated Management) (Pediaditi et al. 2005; Pediaditi et al. 2006).

Objectives and Indicators

Indicators of sustainable development have been a subject of discussion ever since the term ‚sustainable development' was introduced. For this reason, here is a reminder of the ‚official' definition of the term given by the UN: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development 1987: 43). While it is true that the debate about sustainability indicators is already going on for a long time (Birkmann 2004:

p. 61) the handling of sustainability indicators is still in the experimental stage (Finke 2002). However, numerous lists of sustainability indicators exist for different topics. The question is how the indicators - and the objectives they are based on – can be "integrated into an answer as to whether something is sustainable or not" (Morse et al. 2001: p. 1) and furthermore how this decision can influence the planning practice. This is also true for the field of brownfield regeneration. RESCUE developed criteria consisting of 34 objectives and 61 indicators to evaluate the brownfield regeneration process with regard to sustainability in urban development (Franz & Nathanail 2005). REVIT developed in Stuttgart for the case study "Güterbahnhof Bad Cannstatt" 37 site specific objectives and 70 indicators (Langer et al. 2006b: p. 37-43). In both projects emphasis was laid on the discussion about how to integrate these indicators into the planning process.

Participation for Sustainability Assessment

All approaches for the assessment of the sustainability of brownfield projects named in the introduction are based on the understanding that sus-tainability objectives for brownfield regeneration can not be equally relevant for all brownfield sites. Their importance varies from site to site, from region to region and also from stakeholder perspective to stakeholder perspective (Franz & Nathanail 2005: p. 23). For the definition and weighting of site specific indicators a participation process is needed. Such workshops are nothing new: They are often used in different participatory contexts of spatial planning, but special objectives and indicators for the brownfield-topic and especially adequate workshops are a relatively new topic.

The discussion about objectives, indicators and related workshops for the brownfield-topic are embedded into a context in which professionals involved in brownfield regeneration get aware for the fact, that specific local human and social factors need to be considered in the planning process […]. A socially well balanced planning process, offering participation opportunities for all parties concerned, provides the necessary conditions for sustainability standards […]" (RESCUE 2005: p. 11).

Figure 1:
Lively discussions in the working groups of a workshop for the selection of objectives and indicators in Stuttgart

How to design a workshop for sustainability assessment?

Concerning the implementation of an adequate workshop generally three main phases have to be taken into consideration: the preparation phase, the workshop phase itself and the follow-up phase.

<u>The preparation phase</u>

At this stage of a participatory approach the political and administrative preparations have to be managed. This means, that it is important to obtain political backing for the goals and contents of a public discourse before it was carried out so that the politicians are willing to take the outcomes into consideration in the following political decisions concerning the area to develop. At this time it is also important to coordinate the different departments which are affected by the develop-ment. A common discussion and preselection of objectives and indicators to discuss is also essential for a successful workshop. The objectives and indicators should be:

- "conformable with the relevant scale
- meaningful for the area under consideration
- pragmatic (verifiability, availability of requisite data)
- illustrative and easy to understand (communicability, marketing),
- capable of exerting a profound controlling effect and
- meaningful for sustainable urban develop-ment" (Langer et al. 2006b: p. 14).

At this stage it is also crucial to define the target groups which should be reached with an invitation.

The workshop phase

For the workshop phase itself it is helpful to have a clear defined timetable, and - depending on the number of participants - not to discuss only in plenary sessions but also in working groups to intensify the debate. A neutral moderator can help to keep the timetable and facilitates the debates. A guided tour of the area at the beginning of the workshop (Fig. 2) can be highly valuable as the authentic impression enliven the subsequent discussions and put the participants on an equal footing with regard to their knowledge.

Figure 2:
A guided tour to the site at the beginning of

The follow-up phase

It is important that the workshop is documented in detailed minutes. Thus, the minutes serve to

- visualise and finalise the results of the discussions,
- provide basic information for interested parties (e.g. internal inquiries),
- provide a basis for future discussions (may be quoted),
- indicate that the dialogue will continue,
- provide meaningful information for the local council, and
- condense the results in the form of a summary to prepare future political decisions and to form a bridge leading to subsequent development steps (setup of a suitable project organisation, further dialogue offers, marketing).

If the results of the workshop should lead to an implementation in daily planning and politics it is crucial

- to inform the political bodies of the outcomes
- that high priority goals should be formulated in more concrete terms for subsequent plans, particularly in the developmentplan process.
- As well the administration should develop – based on the lists of objectives and indicators - a policy paper on ‚modules for sustainable development' which should be adopted by the local council to serve as a basis for urban-development and purchase contracts.

So not a participatory workshop itself is only important but also how it is embedded in the political and planning context (Oppermann & Langer 2003). Special

procedures and forms to integrate the results in project decisions are the SAT (Glöckner et al. 2004; Franz & Nathanail 2005; Franz et al. 2006), the SAT-BPM (Sustainability Assessment Tool – Best Practice Methodology) (Sokol 2004) and the RAF (Redevelopment As-sessment Framework) (Pediaditi et al. 2005; Pediaditi et al. 2006)

The need for stakeholder participation across a project lifecycle

Attempts at sustainable brownfield regeneration are a learning process. The perception of what is sustainable, the instruments for its implementa-tion and the indicators for its quantification and evaluation can change over time (Franz & Nathanail 2005). Thus, "the sustainability of any redevelopment should be assessed across the life cycle of its new land use, and should be balanced against current use and the sustainability impact of remediation." (Pediati et al. 2005: p. 174). As argued above such an assessment is only possible if the different stakeholder perspectives are taken into account. This makes stakeholder participation across a project lifecycle necessary.

Conclusions

There is not only one way to discuss objec-tives for sustainable brownfield revitalization. A lot of conditions have to be taken into consideration while designing a participatory approach: the political and planning culture of a municipality, the project stage, the affected target groups you want to reach with a public discourse, the time frame and money you have to realise a public debate.

A workshop related to participatory objectives and indicators is not a guarantee for more sustainability but

- it harnesses the knowledge of the local community and experts,
- it helps to adjust the concept of sustainable development to the local context of a project,
- it contributes to more transparency of planning processes,
- it plays an important role as political signals to integrate aspects of sustainability in urban development and planning.

At the same time it has to be clear that one single event module is not enough to deal with all relevant issues exhaustively and involve all target groups in a satisfactory manner. Thus, a workshop on objectives and indicators assumes the important role of a kick-off event to be followed by further ‚tailor-made' meetings.

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9.1.2 The REVIT-Indicator-Concept of a planning workshop in Stuttgart

Nils Krieger

ABSTRACT

This paper describes the Stuttgart experience with the indicator workshop. Based on the idea of the RESCUE-SAT the Stuttgart approach was organized in order to find the site specific indicators for sustainable development by discussing them with the main actors concerning the area , the local agents and inhabitants of Bad Cannstatt, the owners and investors, representatives of the administration and the politicans. The result of this approach is a first draft for "10 key-principles for sustainable development" in the REVIT-area as a base for future decisions. And beside of this it was a good new experience and a suitable contribution to the planning culture in Stuttgart.

Introduction

The public REVIT Planning Workshop was or-ganized as a tool for the public discussion, selection and identification of **site specific objectives and indicators** for sustainable development in the REVIT-area. It based on former own experiences with indicators in Stuttgart on the different planning levels and the RESCUE-SAT approach. It was formed as a part of the participation process. The discussion mainly concerned subjects of the master plan level 1:2500, partly the level of single buildings 1:500. It was important to obtain political backing for the goals and contents of the Workshop before it is carried out. Concrete development concepts were already be formulated, the local council has been involved to take the results into account.

Figure 1: Over 100 actors with great willingness to support sustainable development in the REVIT-area.

The Planning workshop

The process can be considered in three phases: the preparation-phase, the workshop-phase itself and the follow-up phase.

In the **preparation-phase** in Stuttgart an organisation team was set up. One of the preparatory meetings was used to

Figure 2: Small talk in the coffee-break. "Keep this good feeling"

compile objectives and indicators implied or explicitly stated in existing plans. Participants of the Planning Workshop were invited in personal letters by the mayor in charge: Interested citizens, representatives of the administration, civil organisations, real-estate industry, local economy, and local political representatives.

The **workshop itself** was organized on the 18th of October 2005 and was scheduled for about 5 hours on one afternoon during week. It started at 3 p.m. with a site-visiting tour. The Workshop was opened by some keynote presentations to describe existing development goals, the project's importance and opportunities for urban development, the cornerstones for the development, and to introduce briefly the functions and opportunities relating to objectives and indicators. Different working groups discussed about 90 minutes time, amend, delete, modify, and weight the objectives and indicators suggested by

Figure 3: The workshop location in a former store house near the REVIT-area

10 Key-Principles for the REVIT-area Stuttgart

1. Ensure urban mixture of multifunctional usings
2. Ensure well-balanced social mixture
3. Strengthen residential functions
4. Strenthen functions of economical affairs
5. Ensure high quality standards in the buildings and the surrounding area
6. Look for attractive greenspaces
7. Ensure sustainable mobility
8. Reduce noise pollution
9. Reduce energy and water consumption
10. Continue and intensify participation and quartermanagement

Figure 1:
10 key-principles for sustainable development of the REVIT-area

the preparation team.

In the **follow-up phase** the REVIT Workshop was documented in detailed minutes. The responsible department of the administration was looking for the further implementation of the workshop results. Therefore on this base

- a short version, a list of the main objectives and indicators war worked out
- an **additional round table discussion** with some experts together with a delegation of the REVIT-partner Tilburg was organized in order to qualify the results.

The result was a first draft for "1**0 key-principles for sustainable development**" in the REVIT-area. This paper is the basis for the further policy discussion and

Figure 4: The Master Plan Mercedesstraße

should be adopted by the local council to serve as a basis for urban-development and purchase contracts. It should be also the base for the further participation in the ongoing plan-ning process.

Conclusions

There was a great willingness of all actors to participate on a planning workshop and to invest time in order to support and encourage a sustainable development in the REVIT-area.

The most important aspects for the further actions would be

- to ensure good implementation of the workshop results in the political discussion
- to organize follow-up workshops and discussions in order to develop the moduls more and more concret and obligatory during the whole planning process and – last not least – "keep this good feeling", the participants had after the workshops.

All together the REVIT-approach was a good instrument to increase sustainability aspects in the planning process, to influence the image of the area and to get positive marketing effects.

Indicators (Examples)

1) Ensure urban mixture of multifunctional usings

That means:

- develop small urban units typical for Bad Cannstatt (max. 1 ha)
- ensure mulifunctionality (building-up site max. 2000qm)
- reserve the ground floor for flexible usings exept residentials

2) Ensure well-balanced social mixture

That means:

- create new living-forms for active and creative people (for example 20%)
- high standard of modern infrastructure (for ex-ample 100% kindergarten-supply)
- ensure good standard for kids and old people (for example 100% without barriers)

Figure 2: Indicators (Examples) for monitoring

9.1.3 A Sustainable Evaluation Process for Brownfield Sites

Andrew Gray

ABSTRACT

Researching, developing and applying a common set of sustainable indicators and an evaluation process to the development of Brownfield sites is like the quest for perpetual motion, applaudable, but as yet, impossible.

The REVIT project, funded by INTERREG IIIB, aims to develop joint approaches to the development, management and promotion of Brownfield sites. A key component of this project has been to find ways of applying the principals of sustainable development to the renewal of Brownfield sites. One of the key issues to be addressed in this respect is the legal and institutional frameworks that set the context for sustainable development in each partner country, i.e. what are the key drivers and policy issues. The REVIT Project research has developed method that can apply sustainable development principals to individual sites, through an iterative and integrated approach, where both EU as well as local targets to improve the status of the environment, economic and social well being are continually assessed and addressed.

Introduction

Brownfield sites generally have a bad press regarding their status within the realms of urban development opportunists. This is not without foundation. Brownfield sites are often associated with high risks of development, including, contaminated land and ground water, structural problems to land and buildings, high costs of remediation and development and a poor perception amongst local stakeholders. If this is not sufficient to quell enthusiasm for renewing Brownfield sites, then the length of time, planning issues, and finding opportunities for reuse present further obstacles.

This series of pessimistic outlooks can be viewed alternatively by a more optimistic approach. This is that Brownfield sites present opportunities to realise sustainable development improvements and thus they can have a positive impact on the environment, local or regional economy and the social capital of previously blighted areas.

This positive approach however, requires credible improvements to be made over the long term, which can be quoted, verified and marketed, with confidence. This in turn requires a method of establishing a sustainable development status baseline, an evaluation system and a way of measuring improvements.

Sustainable Evaluation Process

The process of sustainability evaluation requires two main elements: sustainability objectives, against which project parameters are weighted and a methodology, which measures and shows if, and or how sustainable development issues have been addressed within a project.

Regarding sustainability objectives, re-

search studies emphasize that sustainability cannot be defined generally for all (Brownfield) projects. Each project has its own sustainability definition which is based not only on project parameters but also on specific, broadly defined local conditions.

However, documents setting the sustainability agenda at global and European level are considered as obligatory in addition to legal and policy issues for sustainability that require to be implemented at national and/or regional level. The selection of sustainability objectives should also consider funding institution requirements such as EU programmes and local regeneration funds.

The Sustainable Evaluation Process developed by the REVIT Project shown in figure 1, shows that at its apex three interconnected elements;- the site, its context and its vision. The first stage requires a full evaluation of these elements in order to provide a firm vision for the site. Within the general context the following issues should be considered:-i.e.

- Qualitative and quantitative data describing the current regional situation in respect of sustainability issues e.g.:
  - * environmental
  - * social
  - * economic
  - * institutional
- Strategic planning:
  - * regional/urban development concepts
  - * regional/urban land use plans
  - * other documents setting current and future situation of area

To ensure optimum data availability and the cost-effectiveness of the indicators selected to monitor the project impact, the process suggests that administrative units to be used, are at the following scales - 1:10, 000, (area planning) 1:2,500 (master plans) and 1:500 scales (buildings and infrastructure). In addition project-specific indicators should be cost effective in terms of data needs and monitoring requirements.

Once the vision has been created then the objectives of the project need to be established and agreed.

The process of agreeing on the sustainable objectives of a site has to be based on agreements achieved through discussion between institutional and non-institutional stakeholders affected by the project. The depth of participatory approach depends in reality on conditions such as owner attitude, scale of project and quality and level of local governance culture.

To be sure that stakeholders participation will bring desired outcomes, the process has to be professionally designed integrated with other project activities from earliest stages and adjusted to local conditions.

To design and implement a process of stakeholder engagement it is advised to use professional guides and manuals providing theoretical overview of the topic together with practical indications regarding optimal project-specific conditions methods and tools. For example A Tool Kit for Stakeholder Engagement prepared by ,Urban Regeneration of Torfaen County Borough Council Team as a part of REVIT project.

This process of agreeing the sustainable objectives of a site may require a revision to the original objectives and in some cases altering or changing the vision for the site. The proposed process allows for cycles of changes to take place on an iterative basis. Once the objectives have been agreed then the appropriate tools and targets, indicators and measuring techniques can be selected. This in turn leads to a management plan to manage this process throughout the duration of the project, reporting, variances to agreed

tolerances, verifying compliance and reporting results. Finally an audit process will ensure that the results are verifiable and the sustainable benefits of the project are credible as well as ensuring that the project plan aims and objectives have been met.

Conclusions

A common set of sustainable indicators and an evaluation process to the development of Brownfield sites at an EU or even National level is not practical or possible. What is important is that sustainable development issues are integrated into Brownfield projects from the start. This requires an explicit set of aims and objectives to be agreed as to how each Brownfield site is expected to respond to the sustainable development agenda. A key question to be determined at the outset is is will the weighting of a new project be biased to the environment, economic growth or social improvements? Each of these or a mix thereof will present different sets of indicators, targets and aims for a project to attain a unique status of sustainable development.

The sustainable evaluation process set out in this paper suggests that a common approach to developing a Brownfield site along sustainable development principals is possible. This process allows for the respect of individual circumstances related to Brownfield sites and their proposed development as well as providing for an iterative approach required to respond to changes that inevitable occur during long term and complex projects.

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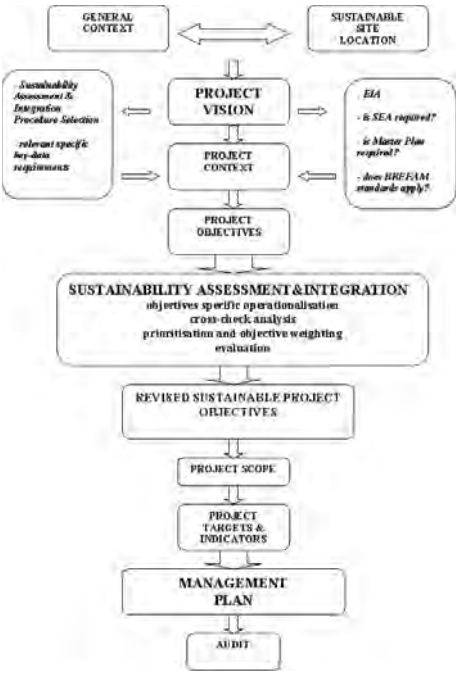
ANNEX

Flowchart illustrating sequence of Sustainable Evaluation Process Stages



9.2

The Luda Project

9.2.1 Monitoring Quality of Life in Urban Regeneration

Christiane Westphal

ABSTRACT

Monitoring quality of life in urban regeneration is a complex task with multiple challenges, such as the need to capture the multiple dimensions of quality of life or the need to go beyond considering statistical data by also including perceptions. Current European approaches towards monitoring take different paths towards resolving these multiple challenges, from applying sophisticated statistical methodologies to developing local monitoring systems by community-led processes. Based on a comprehensive analysis of the strengths and weaknesses of these systems, the LUDA project elaborated a monitoring approach specifically designed for monitoring quality of life in areas of deprivation and urban regeneration. This monitoring system is currently implemented within the city of Dresden. Key elements of this approach are a reference framework to determine quality of life, the inclusion of internal and external perceptions, as well as the consideration of synergies and unwanted side effects.

Introduction

Within the last years the need to monitor urban development has received a growing importance in Europe. Globalisation and competition among cities require municipal decision makers to more effectively guarantee a good quality of life within their city. Simultaneously areas with multiple depriviations evolved. These areas have an urgent need to take multisectoral actions to improve quality of life within these large urban distressed areas. Often, the effects of this urban regeneration towards improving quality of life remain unclear. Monitoring quality of life in areas of urban regeneration shall help to determine those interrelations, and thus improve the effectiveness and outcomes of future urban regeneration activities. However, in regard to monitoring the quality of life in urban sub-units such as areas of urban deprivation or regeneration, there is still a lack of experience.

Among other issues the project "LUDA – Improving the Quality of Life in Large Urban Distressed Areas"[1], dealt with elaborating a monitoring methodology especially designed for those kinds of areas. This paper is based on the results of this project and adds experience from the current implementation of the LUDA monitoring approach within the city of Dresden, Germany (Westphal, Müller, Schiappacasse et al. 2005; LUDA-Team 2006)[2].

In the first section this paper outlines the current challenges of monitoring quality

1 LUDA has been a research project of Key Action 4 „City of Tomorrow & Cultural Heritage" of the programme „Energy, Environment and Sustainable Development" within the Fifth Framework Programme of the European Commission. Lead partner of the project has been the Leibniz Institute of Ecological and Regional Development, Dresden.

2 The key elements of the monitoring system have been developed by the Leibniz Institute of Ecological and Regional Development and Technische Universität Dresden, Fakultät Forst-, Geo-, Hydrowissenschaften Lehrstuhl für Raumentwicklung.

of life in areas of urban regeneration. The second section demonstrates strengths and bottlenecks of current European approaches of monitoring quality of life in regard to the specific challenges experienced in areas of deprivation and regeneration. Based on these analyses, the third section of this paper points out the key elements of the LUDA approach towards monitoring quality of life. Examples from implementing this approach within the city of Dresden are given. The final section concludes by discussing the possible future developments and improvements of monitoring systems directed towards monitoring the quality of life in the context of urban regeneration.

Challenges of Monitoring Quality of Life in Urban Regeneration

The Idea of Monitoring

Monitoring is an important part of the process of defining and implementing urban regeneration policies. It aims to lead to more informed decision making and to improving learning processes by regularly collecting, analysing, interpreting and reporting data (Moore & Spires 2000).

Approaches towards monitoring quality of life in urban regeneration include the observation of alterations of the quality of life in regard to objectives defined by indicator sets or indices.

The performance of regeneration activities is measured by analysing inputs, processes, outputs, outcomes as well as impacts of projects, programmes or strategies (Worldbank 2004).

In this context monitoring is closely related to the process of evaluation that includes the assessment of programmes, plans, projects, instruments and actions in regard to their outputs, outcomes and added values. While monitoring is a continuous process, evaluation is directed at measuring the fulfilment of a set of objectives at a certain time (Moore & Spires 2000).

Challenges of Monitoring Quality of Life in Urban Regeneration

Monitoring quality of life in urban regeneration is a complex and challenging task.

First, quality of life, as well as urban regeneration, are directed towards multiple objectives. Thus, their monitoring requires capturing a great amount of complexity and cannot solely rely on quantitative measurements (Becker 2003; Hemphill et al. 2004; Ho 1999). However, to keep a monitoring system manageable, complexity needs to be limited as well.

Second, areas of urban deprivation and regeneration are comparatively small areas that do not necessarily correspond to administrative or statistical boundaries. Consequently, the availability of data on this level is particularly limited (Becker 2003).

Third, monitoring and evaluating the performance of regeneration activities require attributing improvements of quality of life to the regeneration activities under consideration. As cause-effect-relations are not always well-defined, a system to monitor the quality of life in urban regeneration areas should also consider the unforeseen consequences of regeneration activities such as synergies and side effects (Ho 1999).

Fourth, a monitoring system cannot be established independently of institutionalised decision-making and governance structures. In this context effective monitoring of quality of life in urban regeneration areas asks for including local stakeholders and thus making use of their large base of local knowledge as well as enhancing processes of community building (UN Habitat 2005).

Fifth, monitoring quality of life in urban regeneration is a technical challenge as well, including the task of representing monitoring results in a way easily understood by key decision makers. This requires the use of GIS and other Infor-

mation and Communication Technologies (Curwell et al. 2003).

Strengths and Bottlenecks of current European Approaches towards Monitoring Quality of Life

Current Approaches of Monitoring Quality of Life in Europe

Currently, many approaches towards monitoring quality of life can be found within Europe. These approaches are directed towards developing common European methodologies for monitoring important aspects of European urban life and urban sustainability, for example the Urban Audit or the European Common Indicators (European Communities 2000 a, b). Other steps in the direction towards common European monitoring methodologies have been taken by European research projects, such as TISSUE[3] aiming at a common European methodology for measuring environmental sustainability in European cities, or HQE²R [4], directed towards monitoring sustainability on the neighbourhood level (Charlot-Valdieu et al. 2004; VTT 2005).

Quality of life is also monitored at the national level, for instance with the English Indices of Deprivation (ODPM 2004).

Further monitoring systems, such as Ballymun Community Indicators, have been developed on the local level (Krawczyk 2002).

The monitoring systems named here do not represent a complete list of all monitoring activities in Europe. However, they are typical examples for monitoring quality of life. Therefore, their strengths, as well as unsolved and remaining challenges in regard to areas of urban regeneration, are discussed in the following section of this paper.

Strengths of current Approaches of Monitoring Quality of Life in Europe

Recently, several monitoring systems have been developed that provide successful elements regarding the challenges outlined above. These approaches show a growing multi-dimensional character of monitoring systems as well as an increased inclusion of inhabitants' perceptions.

A strong effort has been made to develop monitoring systems with a multi-sectoral character. For instance, the European Common Indicators, a set of 10 indicators to monitor environmental sustainability on the local level, take into account the core dimensions of sustainability as well as of quality of life (European Commission 2005 a; European Communities 2000b). The Urban Audit aims to measure the quality of life in European towns and cities and covers the domains of Demography, Social Aspects, Economic Aspects, Civic Involvement, Training & Education, Environment, Travel & Transport, Information Society and Culture & Recreation (European Communities 2005a).

Furthermore, monitoring systems currently applied in European cities have been showing a growing tendency towards not solely relying on statistical data. The inhabitants' perceptions of quality of life within their city are increasingly taken into consideration. For instance, the Urban Audit, that is based on comprehensive statistical information, is complemented by an Urban Audit Perception Survey. However, due to the high costs caused by questioning inhabitants, this survey has only been carried out in 31 cities by questioning 300 individuals in each on a broad variety of quality of life issues. The survey included questions on employment opportunities, housing costs, safety, cleanliness of cities, public transport, air pollution, integration of immigrants and the overall satisfaction with the quality of life within the city (European Commission 2005 b).

In addition to this European-level approach, approaches on the local or sub-

3 Trends and Indicators for Monitoring the EU Thematic Strategy on Sustainable Development of the Urban Environment

4 Sustainable Renovation of Buildings for Sustainable Neighbourhoods

city levels especially take inhabitants' perceptions into account, as in, for example, the Ballymun Community Indicators applied in a deprived district in Dublin. Ballymun Community Indicators are a system of 13 indicators covering economic, social and environmental aspects that have been chosen with the help of a community led visioning process, which includes participants such as environmentally interested residents, the Dublin City Council, Ballymun Regeneration Ltd., and other community groups and organisations (Krawczyk 2002).

Remaining Challenges of Monitoring Quality of Life in Urban Regeneration Areas

Although, as outlined above, current approaches towards monitoring quality have shown considerable improvements towards assessing local quality of life, some key challenges remain that must be faced when developing a system of monitoring quality of life in areas of urban regeneration.

Areas of urban regeneration and deprivation especially lack the resources to achieve improvements of quality of life independent from external stakeholders. Therefore, the perception from external experts such as urban planners, investors or the media is important for the further improvement of quality of life within these areas. However, these external perceptions are hardly taken into account when assessing the quality of life within an area (LUDA-Team 2006).

No prime solution for monitoring quality of life has yet been found, particularly for urban regeneration on the (small-scale) subcity level. Systems for monitoring quality of life on this level face the challenge of low data availability. When designing such a system, one has to deal with the need to gain detailed and differentiated information while balancing the need to work with a manageable and therefore limited system. A further challenge is set by the demand of achieving comparability to other areas within the same city or to areas in other cities.

Prevailing monitoring systems take different paths towards fulfilling these largely contrasting demands. For instance, the English Indices of Deprivation, which are applied to measure multiple deprivations on the small area level, rely on comprehensive statistical methodologies within a sophisticated system of national statistics (ODPM 2004). Within the European research project HQE²R, a comprehensive set of indicators on the neighbourhood level is analysed with the help of statistical methodology as well (Charlot-Valdieu et al. 2004). Although these systems are able to describe the state of quality of life within a neighbourhood in a multifaceted way, they lack easy applicability and cause extensive monitoring efforts. Furthermore, systems relying on sophisticated statistical methodologies, including for instance weightings, often lack transparency. Other systems, such as the Ballymun Community Indicators on the local level, individually choose a limited set of qualitative indicators capturing the problems of a specific area based on a community-led visioning process (Krawczyk 2002). While those systems are best designed for monitoring a certain area, they lack comparability to other areas.

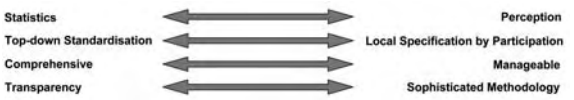


Figure 1: Contrasting Challenges of developing a Monitoring System

Figure 1 summarises these multiple and partly contrasting challenges of designing a monitoring system.

Although the challenges seem contradictory at the first glance, it is nevertheless possible to respond to both challenges within one monitoring system. While there

are systems that rely solely on statistical data or perception, these might as well be combined within one single system.

The LUDA Approach towards Monitoring Quality of Life

Based on the analysis of challenges, as well as on the study of strengths and weaknesses of current European approaches of monitoring quality of life, the LUDA-project has developed a comprehensive approach towards monitoring quality of life in urban regeneration (LUDA-Team 2006; Westphal, Müller, Schiappacasse et al. 2005).

The following section explains the key elements of this approach and shows some examples of adapting this monitoring methodology within Dresden. This implementation adds to those monitoring approaches already applied in the city. To fulfil the requirement of monitoring the quality of life on small-scale spatial levels in Dresden, the system is implemented on the level of 400 statistical districts with an average population of 1300 inhabitants as far as data is available.

The Diamond of Quality of Life

Within the LUDA-project the "Diamond of Quality of Life" has been elaborated as a multidimensional reference framework to capture most important issues of quality of life (see Figure 2).

The idea of the "Diamond of Quality of Life" is that of a common but flexible framework that allows the comparing of quality of life in different cities or in different sub-sections of one city.

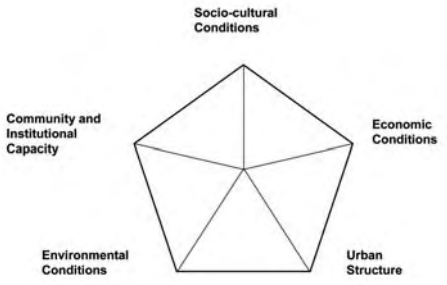


Figure 2: Diamond of Quality of Life (Westphal, Müller, Schiappacasse et al. 2005)

Table 1: Diamond of Quality of Life – Dimensions and Possible Issues (Westphal, Müller, Schiappacasse et al. 2005)

Dimensions	Possible Issues (examples)
Socio-cultural Conditions	Population Structure Household Income Local Employment Knowledge and Skills Health Conditions Safety and Security Culture
Economic Conditions	Economic Base Investment Housing and Property Market
Urban Structure	Urban Design Services and Infrastructures Housing Quality Transportation and Traffic Land Use
Environmental Conditions	Soil Quality Air Quality Open Spaces Waste Management and Recycling Natural Hazards
Community and Institutional Capacity	Participation and Involvement Social Justice and Equity Institutional Capacity Political Capacity Land Use Context

Therefore, each city using this approach is asked to take into account the five dimensions of quality of life and to endorse these by at least one issue important for the quality of life in the area under consideration. A list of possible issues is given in Table 1. Issues should be further operationalised by appropriate indicators. According to the LUDA approach, these should be chosen in a way that potentials, as well as problems, of the area are reflected.

Referring to the "Diamond of Quality of Life" as a common reference framework allows the comparison of the quality of life in different cities by aggregating information on the level of the five core dimen-

sions of quality of life (LUDA-Team 2006; Westphal, Müller, Schiappacasse et al. 2005).

Measuring Internal and External Perception

As quality of life is highly dependent on subjective perception, a monitoring system to observe this topic should not be based on statistical information alone (Hemphill et al. 2004; Becker 2003). Therefore the internal perception of the area should as well be considered by involving the area's key stakeholders (such as inhabitants, as well as local employees and businessmen) into monitoring activities and thus to exploit their local knowledge.

Structured interviews or questionnaires can best be used to find out how inhabitants perceive important aspects of quality of life.

In Dresden, information on internal perception is gained by conducting a citizens' survey. Satisfaction with quality of life is monitored by asking inhabitants how satisfied they personally are with a broad set of living conditions at their place of residence. The inquiry takes into account satisfaction with all kinds of facilities (shopping, social, transport & mobility, green and open spaces, sports, cultural) as well as with important qualities of the local community, such as security or good neighbourhood. Satisfaction is measured on a five-level ordinal scale, with 1 = very satisfied and 5 = not at all satisfied (Landeshauptstadt Dresden 2003).

The scaling of indicators (backed by statistical data) into five classes allows comparison of the objective and subjective perspectives of quality of life, as shown in Figure 3. The map compares the accessibility of local public transport, expressed by the percentage of population located within in a 300°m/400°m radius of a bus/tram stop[5], with the inhabitants' satisfaction with local public transport measured on a five-level ordinal scale (1 = very high satisfaction and 5 = very low satisfaction). While data on accessibility is available on the level of the urban districts, data on satisfaction is only available for larger areas. The comparison reveals that accessibility and satisfaction with public transport does not necessarily correspond. For instance, a satisfaction of 2.2 is experienced in areas of highest, as well as of lowest, accessibility (LUDA-Team 2006).

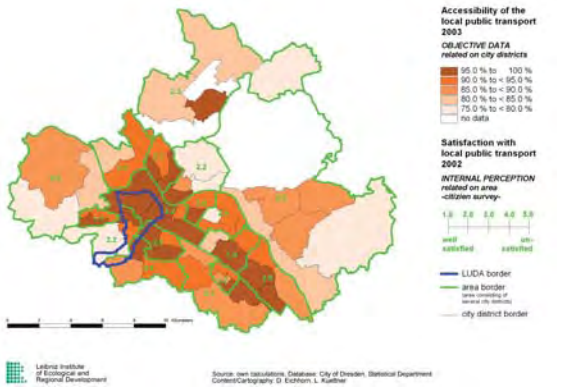


Figure 3: Combining Statistical Data and Information on Internal Perception (LUDA-Team 2006)

As previously mentioned, the perception of external experts such as politicians, planners and investors is another important aspect influencing the options of improving quality of life in areas of urban regeneration. Methods that can be used to collect information on external perceptions include interviews and questionnaires or Delphi surveys (LUDA-Team 2006). In Dresden, for instance, external perception is determined by a "Housing Market Barometer", in which 108 experts from the sphere of housing are asked to answer a questionnaire dealing with issues such as development of housing demand and vacancy rates, investment climate and problems of Dresden's housing markets. One question also refers to the expected development of housing de-

5 300 m radius in inner city areas, 400 m radius in the remaining city area

mand in Dresden's urban districts (Landeshauptstadt Dresden 2004).

Monitoring Synergies and unwanted Side Effects

Impacts of activities of urban regeneration are not restricted to those areas in which they take place. Often, those activities cause synergies as well as unwanted side effects. Synergies can be recognised when areas that adjoin those of urban regeneration develop in a positive way, e. g. when private investment is attracted to a wider urban area. Unwanted side effects appear when areas adjoining those of urban regeneration deteriorate, e.g. when improvements of the urban structure cause an out-migration of the disadvantaged population to neighbouring areas.

LUDA monitoring uses standardisation (z-transformation) and ranking of standardised indicator values to monitor those synergies and unwanted side effects by comparing the relative position of an area to other areas. On a citywide level, comparison of standardised indicator values might be used to determine the relative position of the area of urban regeneration among all other sub-units of a city. On the level of the area of urban regeneration itself, standardised indicators can help to compare the relative development of subunits within those areas.

Unwanted side effects are caused when urban regeneration areas improve their relative position while adjoining areas are deteriorating. Synergies are indicated when areas adjoining those of urban regeneration improve their relative position alongside those regeneration areas (LUDA-Team 2006).

Conclusions

Monitoring quality of life in urban regeneration is a challenging task. It requires the frequent and continuous acquisition and interpretation of objective data and subjective information on the small-scale level of areas of urban regeneration.

The LUDA project achieved a broad analysis of challenges as well as strengths and weaknesses of current monitoring approaches at various levels and in various European countries and cities. At present the LUDA monitoring approach is implemented within the city of Dresden. Concluding from these experiences, some suggestions on developing systems for monitoring quality of life in urban regeneration areas can be given.

As monitoring quality of life is a multidimensional matter and requires data and information from various sources, this task requires co-operation first within the administration and second with private stakeholders.

Quality of life is an issue with tremendous heterogeneity within a city or even within areas of urban regeneration. Therefore, monitoring quality of life in urban regeneration areas requires information on small-scale levels, such as urban or statistical districts. Thus, in the long run efforts should be taken to improve data availability on this small-scale level, not only regarding statistical data but also regarding information on internal and external perception. To be able to determine changes in the quality of life, the same set of statistical data and information on perception should be collected over a longer period of time. However, the system should also be flexible enough to adapt to new issues.

In conclusion, it can be stated that monitoring quality of life in areas of urban regeneration remains a challenge without a patent remedy. Individual solutions will have to be found for every city or area; however, as outlined above, these solutions need to be based on a common reference framework, such as that provided by the "Diamond of Quality of Life".

Most importantly, it must be recognised that although it might be difficult to establish a perfect monitoring system from the beginning, the monitoring of quality of life in areas of urban regeneration is

a necessary step towards better solutions when trying to improve quality of life in areas of urban regeneration. Future programmes to improve quality of life will increase their success only when the effects of past activities of urban regeneration can be estimated.

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9.2.2 Selection of Assessment Methods for Evaluating the Sustainable Regeneration of Large Urban Distressed Areas: a Decision Support System

Steve Curwell, Jemma Turner, Aleksandra Kazmierczak

ABSTRACT

This paper will report on the development of a decision support aid for assessing the quality of life improvements in LUDAs (Large Urban Distressed Areas). LUDAs thus far have proved very difficult to treat in a sustainable manner. One of the reasons for this failure could be limited or inappropriate use of assessment in decision-making process. The aim of the LUDA Decision Support System is to provide a toolkit of assessment methods that can be used by urban practitioners to support decision-making throughout the regeneration of LUDAs. The methods that the expert group felt were relevant to current good practice were mapped against the components in the LUDA Regeneration Framework, i.e. steps of the regeneration process; types of stakeholders; sustainability issues; and different time and spatial scales. The resultant online toolkit enables users to search the database of assessment methods by these criteria and find suitable means to make regeneration process more participative, sustainable and effective.

Introduction

In the European Union, roughly 80 per cent of the population lives in urban areas (Conway and Konvitz, 2000) and cities are considered to be economic engines and generators of growth and jobs (Jacobs, 1984; CEC, 2005). However, the presence of distressed urban areas suffering from multifaceted deprivation weakens cities by impeding economic growth and increasing social injustice (Conway and Konvitz, 2000). The OECD (1998) has stated that distressed urban areas are one of the most difficult problems faced by developed countries, and that this problem worsened throughout the 1980s and 1990s. In the ten countries surveyed by OECD, approximately 20 million people out of a metropolitan population of 185 million were living in deprived areas (OECD, 1998, p. 11). The European Commission has also early pointed out the importance of the sustainable rehabilitation and development of urban distressed areas in the Green Paper on Urban Environment (CEC, 1990). However, until recently, the policy, research and practice of urban regeneration tended to restrict the actions to smaller areas (neighbourhoods and estates), while the situation of large distressed parts of cities has been often neglected.

Most of the European cities contain large urban distressed areas (here referred to as LUDAs) that suffer from interlinked environmental, social and economic problems, as well as from faulty urban structure and weak institutional capacity. Their significant physical dimensions, the number of their inhabitants, and the important role the areas often play in the functioning of the urban fabric, magnify the complexity of the problem. In many cases LUDAs have entered a vicious cycle of decline (Ekins and Cooper, 1993) and their future

is extremely unpredictable. Factors such as migration, housing policies and image created by publicity (Conway and Konvitz, 2000) can either depress the area further or help to revive it.

Consequently, coping with unpredictability requires far-sighted strategies and flexible planning supported by a robust decision-making process. In reality, however, city planners and other officials who are responsible for delivering sustainable urban regeneration often have little means to cope with such an intricate task. This can lead to shortcuts in analysing the situation and decision-making process. Indeed, it has been recognised that the failure of many regeneration projects hitherto has been related to 1) limited use of ex-ante assessment in the process of decision-making, and 2) an unstructured approach to the regeneration process.

According to European Commission (2001) experience of ex-ante evaluations is still scarce in the EU structures, and there is also a lack of established good practice in the Member States. In particular, in relation to urban regeneration programmes, the assessment process has more often than not been limited to ex-post evaluation concentrating on achievements in terms of programme outputs and on value for money (Ho, 1999). For example, absence of ex-ante assessment – and overall lack of monitoring and evaluation culture - has been recognised as one of the principal weaknesses in programmes supported by Structural Funds in the North West of England (Ecotec, 2007).

Ex- ante appraisal is seen as an effective management tool (EC, 2001) for providing information on the basis of which decision makers can judge the value of a proposal (EC, 2000). Good quality ex-ante evaluation supports rational decision-making as it allows assessing whether proposed solutions are in accordance with the expected results and impact. While ex-ante assessment cannot guarantee that the selected option will deliver sustainability in practice, it offers much greater assurance whether the course of action taken is leading in the appropriate direction and reduces the risk that decision-makers of putting into practice inappropriate and ill-fitting programmes. Moreover, reliable ex-post evaluation, and hence accountability for results and impacts, is largely dependent on the quality of the preparation of the intervention at its outset (EC, 2000).

There is an increasing pressure on local authorities and other organisations delivering urban development or regeneration projects to use ex-ante assessments. The Environmental Impact Assessment Directive (Council of the European Union, 1997) has been implemented for nearly ten years now and the legal requirement for Strategic Environmental Assessment (European Parliament and the Council of European Union, 2001) across Europe is likely to boost use of ex-ante evaluations (SKM, 2006; WSP and GONE, 2006). The ex-ante appraisal is an integral part of the Structural Funds programme development (EC, 2001; European Council, 2006; GOWM, 2007). Also, national initiatives to implement the EU's SEA directive in member states are likely to emphasise use of ex-ante assessments, e.g. The Sustainability Appraisal in the UK (ODPM, 2005) puts a requirement on local authorities to integrate assessment into regional and local development strategies.

The importance of large urban distressed areas in the functioning of European cities, inefficiency of regeneration programmes to date, and the current inadequate use of ex-ante appraisal in regeneration projects prompted the launch of the "Improving the Quality of Life in Large Urban Distressed Areas" research project, funded within the Fifth Framework Programme of the European Union (2003 – 2006). This project aimed to contribute to the improvement of the quality of life in LUDAs by providing a strategic approach for sustainable development, based on rational and systematic decision-making.

This paper summarises part of the work

led by the University of Salford aimed at developing the Decision Support System (DSS) for its use in the LUDA Compendium (LUDA Team 2006a). The LUDA DSS is an online collaboration toolkit comprised of a number of different components designed to guide regeneration professionals and other experts towards the key issues in the decision-making process, to appropriate evaluation methods, tools and techniques to use at each stage, to provide them with a short introduction to, and where they can find further information on each method. The system is aimed at expert users who already have some prior knowledge and experience of urban regeneration and its evaluation.

The paper explains how assessment methods and techniques were selected for inclusion in the DSS, the process and framework used to locate the methods in the DSS, the standardised format used to describe methods and techniques and how

Applicability of methods

Preliminary list of methods and techniques

A preliminary list of assessment methods and techniques that could be applicable to regeneration of LUDAs was drawn-up by the University of Salford (table 1), based on three sources; (1) 57 assessment methods already explored in a previous research project, BEQUEST (Building Environmental Quality Evaluation for Sustainability through Time), funded by the EU in the Framework Programme 4 (BEQUEST, 2000; Deakin Et al 2001, Curwell et al 2005); (2) other methods proposed by researchers participating in the project or (3) drawn from literature. The overarching criterion for inclusion was method's applicability to the problems of sustainable redevelopment of large-scale urban regeneration. However, a number of the methods considered in BEQUEST were not applicable to LUDAs because of their scale of application (e.g. individual building or regional scale). The most generic methods and those focused on the

Table 1: Preliminary list of 46 methods and techniques

Assessment methods and techniques	
Analysis of interconnected decision areas (AIDA)	Life cycle analysis
Analytic hierarchy process (AHP)	Managing speeds of traffic on European roads (MASTER)
Availability of public, near-residential green spaces (APNRGS)	**Meta Regression Analysis (MRA)**
Brainstorming sessions	Multi-criteria analysis (MCA)
BRE Environmental Management Toolkits	Project impact assessment
Cluster analysis	Prospective process through scenarios
Community impact evaluation*	Quality of life assessment
Competence trees	Regime analysis
Concordance analysis	Risk assessment
Contingent Valuation Method (CVM)	Scenario development
Cost benefit analysis (CBA)	Semantic differential
Cross impact analysis	Social cost-benefit analysis
Ecological footprint	Social impact assessment
Economic impact assessment	**SPARTACUS (System for Planning and Research in Towns and Cities for Urban Sustainability)***
Environmental impact assessment (EIA)	Spider analysis
Environmental impact model	Strategic conversations
Expert Judgement	Strategic environmental assessment (SEA)
Explorative Quarter Research	Survey questionnaires
Flag model	Sustainability appraisal (SA)
Futures workshops	SWOT analysis
Hedonic Analysis	**System Dynamic Approach**
Horizon scanning	Visioning
Integrated sustainable cities assessment method (ISCAM)	Wind tunnel testing

building scale of assessment were therefore eliminated from the preliminary list of assessment methods and techniques.

Consultation with the research team

A consultation exercise with the research team and city partners in the LUDA project was carried out to validate the suitability of the methods after concerns were expressed by the six city partners[1] about the high number of methods and techniques in the preliminary list. The practical reality of the regeneration situation in cities was a main driver in the project and they were concerned that 51 methods were too many to handle or because they were just emerging from the research phase. The survey involved the eight research partners in the project[2] consisting of a survey group of approximately 15 researchers. The group was asked to report on their level of knowledge and experience of the methods and techniques in the preliminary list. The results showed overall that the survey group had little or no knowledge or experience of eight methods. As a consequence, it was decided that these methods (highlighted in bold in Table 1) would be withdrawn from the LUDA list. This decision was based on two assumptions: a) that the research community would not be able to offer the necessary support to the case study cities on any matter relating to these methods; and b) that the research team in the project would not have the required knowledge and expertise to write a detailed description of these methods for the online toolkit (see later section). Moreover, on closer inspection it became evident that the eliminated methods were either: insufficiently targeted towards the complex nature of the problem situation in LUDA's (e.g. BRE Environmental Management Toolkits); or would require too much time and resources for the cities to get to grips with the detailed underpinning of specific methods (e.g. ISCAM). This action resulted in a set of 38 applicable assessment methods to be taken forward into the first database of assessment methods and techniques. During this process the methods were also classified as; commonly used (eg. SWOT analysis, Cost Benefit analysis), well established (e.g. Ecological Footprint), or still experimental (e.g Managing speeds of traffic on European roads (MASTER)).

In the later stages of the project the consensus in the LUDA project was that SEA, SA and PPtS should be classed as process models. That is procedures in their own right, rather than methods that deal with targeted assessment of individual projects and problems. For this reason these process methods were withdrawn from the preliminary list of methods and techniques (as highlighted in green in Table 1) and utilised in a more effective way as discussed below. This left a total of 35 assessment methods and techniques to be taken forward into the final database of methods and techniques.

LUDA Regeneration Process Framework

LUDA Regeneration Process Framework is a set of issues to be taken into consideration when approaching urban regeneration problem in a holistic and integrative manner. The LUDA Regeneration Process Framework (see Figure 1) helps the decision-makers to better comprehend the complexity of sustainable urban regeneration by structuring it in five main dimensions:

1. Steps in the Regeneration Process of LUDAs;
2. Different types of stakeholders;
3. Various sustainabilityissues;
4. Diverse spatial levels of action and impacts on the environment; and
5. Different time scales of impacts.

The main purposes of the LUDA Regeneration Process Framework are to 1) to

1 Edinburgh, Florence, Lisbon, Bratislava, Dresden and Valenciennes.

2 IOER (Dresden), University of Salford, Napier University (Edinburgh), Slovak University of Technology (Bratislava), University of Salzburg, University of Florence, Lusofona University (Lisbon) and SMASH (Paris).

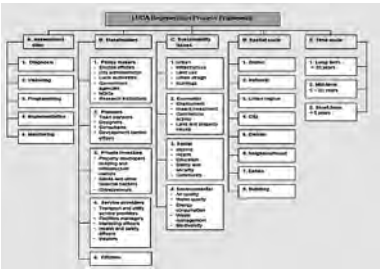

Figure 1:
LUDA Regeneration Process Framework

systemise the process of urban regeneration, and 2) to allow categorisation of the methods and techniques according to this set of criteria, and subsequently, for supporting the selection of methods as part of the on-line toolkit. The five main dimensions are described in more detail in the following sub-sections.

Methodology used to develop the regeneration process framework

The regeneration process framework was adapted from the sustainable development framework developed in the previous BEQUEST project (BEQUEST 2000). The LUDA regeneration process was developed by the LUDA research team, led by University of Salford in consultation with the city partners through an iterative process of consultative workshops (8 in total). Various sustainable regeneration issues and process models were put forward for consideration at the workshops and the feedback used to develop consensus over the model described below. It was particularly difficult to establish a consensus view of the regeneration process itslef. A solution was found in an approach to urban regeneration planning that amalgamates two established (1 & 2) and two emerging (3 & 4) participative planning procedures that seek to structure the re/development process and its assessment:

1. CoSGOP – Collaborative, Strategic, Goal Oriented Programming (GTZ, 1988), which emphasises the importance of participation of all stakeholders in a flexible and responsive planning process.
2. Prospective Process through Scenarios that focuses on the use of futures techniques and stresses stakeholders' involvement, emphasising the development of shared objectives and shared vision of a distress-free future.
3. SEA – Strategic Environmental Assessment (CEC 2001), which puts an emphasis on identifying the baseline conditions for any major (re)development proposal. In this context the SEA process provides for managing and monitoring through the assessment of impacts of the regeneration initiatives.
4. SA – Sustainability Appraisal (ODPM 2005), the UK's approach to implementing SEA Directive into national legislation, focusing on establishing goals and objectives to be achieved.

The applicability of these four process methods to the sustainable urban regeneration was confirmed through analysis of the renewal strategies adopted by the reference cities . Four main approaches to the regeneration included:

- **Asset-Based Community Development (ABCD)**, an attempt to building sustainable future on the community and individual strengths, talents and resources. Similar stakeholder-centred approach is represented by **CoSGOP** (adapted in Malmö, Ostrava and Antwerp).
- **Needs-oriented strategy and potential-based strategy**, focusing on the recognition of the baseline situation in a like manner to **SEA** (Trnava, Manchester).
- **Vision-oriented strategy**, in the LUDA approach present by integrating the futures thinking (similarly to **PPtS**) and goals and objectives to be achieved (like **SA**) into the Regeneration Process (Graz, Tallinn, Genoa).

Table 2: Exemplar of Protocol: Diagnosis

Diagnosis - tasks					
Task	Stakeholder analysis	Resources and limitation analysis	Identification of drivers for change	Identification of problems and potentials	Development of distress indicators
Order of tasks	1	1	2	2	3
Input information	the area and borders of LUDA; population characteristics; list of businesses	Financial and human resources; policies and strategies relating to the LUDA; funding; data availability	Statistical data; experts opinion; media; futures publications	Objective / subjective	Baseline information on data availability
How to complete task?	e.g. Identify all groups of stakeholders interested in the regeneration of the area	e.g. Consider the broad needs of the planned regeneration programme, i.e. capital, time-span, etc.	e.g. Undertake a comprehensive 'scanning' exercise to identify forces driving change	e.g. Analyse statistics (environmental, social, economic)	e.g. Choose indicators that reflect the widest range of sustainability issues
Methods and techniques	Brainstorming, Community impact evaluation, expert judgement, Survey questionnaires, etc	Analysis of Interconnected Decision Areas, Analytic Hierarchy Process, Cost-benefit analysis, Futures Workshops, etc	Horizon scanning, Scenario development, Strategic conversations, Visioning, etc.	Cluster analysis, Ecological Footprint, EIA, Economic Impact Assessment, etc	Flag Model, Futures Workshops, Multi-criteria analysis, etc
Output of the task					
Overall output of this step	Analysis of the baseline information paints a picture of the distress situation in LUDA. Draft scope of the possible regeneration activities is indicated by available resources and limitations. The focus is established on the identified problems and potentials and the approximate direction of change justified by the external drivers for change and global trends. Confirmation of the physical dimensions of the LUDA area.				

The combination of actions undertaken within each of the four amalgamated process methods led to the development of a protocol for each step containing tasks that decision-makers can follow in their day-to-day activities. For an exemplar of a protocol see Table 2, which shows the tasks involved in the Diagnosis step and the type of guidance that is offered.

The process steps, along with the foundation of protocols that relate to the tasks undertaken within each step, are described as follows.

Steps in the regeneration process

Diagnosis

The aim of Diagnosis is to investigate, recognise and benchmark the current situation in environmental and socio-economic terms by carrying out extensive baseline assessment. This assessment includes identification of stakeholders, analysis of problems, potentials and drivers for change and estimation of resources available for the regeneration process. Completion of the first step in the regeneration process is necessary to establish the extent and focus of the regeneration programme that is formed in following steps of the regeneration process.

Visioning

The overall aim of this regeneration step is to produce a shared and desirable vision for the future, through collaborative work with all stakeholders and with the use of futures methods and techniques. This vision is translated into a set of policies, with clear objectives and measurable targets. Visioning is crucial for the success of urban renewal as it results in a framework specifying the collective idea of regeneration.

Programming

In the Programming step of the LUDA Regeneration Process, the regeneration programme (here referred to as master plan) is built on the framework of policies developed in Visioning. The master plan gives spatial, chronological, organisational and financial dimensions to these policies; it presents the broad planned land

use in the area and realisation strategy of the regeneration programme. The master plan, to guarantee enhancing all sustainability aspects, needs to be appraised in economical, social and environmental terms.

Implementing

In the Implementation step the master plan is 'fleshed out' with individual projects and proposals. These are selected based on their effect on sustainability issues and then put into life. Sustainability and smooth realisation of the implemented projects is being secured by formative assessment measures that can be seamlessly incorporated into the day-to-day management.

Monitoring

The results of the entire regeneration programme as well as the performance of individual projects and initiatives are assessed and evaluated here. The overall change in LUDA is measured by comparing the current quality of life to the baseline conditions. If the results of the regeneration process are not satisfactory, the remedial actions need to be undertaken.

Stakeholders

It is important to establish who is responsible for both: applying the method or technique; and those stakeholders involved in the consultation and decision-making process. As Figure 1 illustrates, the main groups of stakeholders are Policy makers, Planners, Private investors, Service Providers and Citizens. It could be argued that citizens form the most important group in terms of involving, or more specifically, empowering communities to take the lead in issues that affect their area (Burton, 2003); however, citizens are unlikely to get involved in any assessment that is carried out with the exception of consultation that may be required as part of the method or procedure. In fact, it will most likely be planners who will undertake specific assessments as part of the overall regeneration programme.

Sustainability issues

Recognising and fully appreciating sustainability issues is a fundamental aim of any regeneration programme, most importantly in terms of identifying objectives, targets and indicators to be carried through to the design of the action plan and to be used for monitoring the effects of the overall programme and related projects. For the purposes of the LUDA project, these have been identified as: environmental, social, economic and urban aspects. Along with the 'three pillars' of sustainable development, the urban dimension has been added to represent physical aspects not covered by the environmental domain, and to fully appreciate the holistic nature of sustainable urban regeneration.

Spatial levels

In the framework, spatial levels are classified as Global, National, Urban Region, City, District, Neighbourhood, Estate and Building. Although the level of LUDA intervention is usually at a district and neighbourhood scale, the scale of assessment related to impacts can be felt at a much wider scale. For example, the building of a new road can have significant effects at the neighbourhood level, but there may also be impacts at a wider, regional level, e.g. economic benefits or large ecological footprint.

Time scale

Again, although a regeneration programme will usually take up to ten years to complete, the impacts of assessment can be felt much longer than this. For example, the area will still have to be monitored for any changes long after the programme is complete.

Database of assessment methods and techniques

The database aligns the assessment methods and techniques to the issues in the LUDA Regeneration Framework. It

includes detailed descriptions of all the methods in the final, agreed list of methods. The development of the database relied heavily on work that had already been carried out, both in terms of pro-forma adapted from BEQUEST, and the LUDA Regeneration Process Framework, as already been discussed.

Descriptions of methods and techniques

The detailed descriptions were written according to a pro-forma, which was adapted from the BEQUEST project. While the LUDA pro-forma retained much of aspects of that in BEQUEST, such as a general description, status, data requirements, etc, it also included some additional items. Principally, it took the main dimensions from the LUDA Framework and used these to structure much of the pro-forma. A detailed description example of Ecological Footprint using the pro-forma is shown in Annex 1.

A small consultation exercise was carried with the LUDA research team in order to ascertain who would be best placed to write a detailed description of each method. The decision was based on who had the most experience of applying the methods, and where this was absent, who had the most knowledge of the relevant method.

The on-line toolkit

The on-line toolkit, available via the 'Select method' function in the LUDA Compendium (LUDA Team 2006a), is a navigational interface designed to enable an expert user to select appropriate methods based on the criteria in the LUDA Regeneration Process Framework (Figure 2). The user can choose any combination of the criteria from the drop-down menus to obtain a list of applicable assessment methods and techniques. For example, if the following criterion is chosen: Step: Implementation; Stakeholders: Private Investors; Sustainability issues: "Any"; Spatial scale: Building; and Time-scale: Short-term, this will bring up the list of methods as shown in Table 3. The user is also able to use the "Any" option in one or more of the drop-down menus; for instance, if the user wants to be provided with methods that only relate to social issues and nothing else then this is possible. Alternatively, if the user would like to view the full list of methods then they would select the "Any" option for all five drop-down menus.

Table 3 shows the list of methods applicable to the chosen criteria as well as the status of the selected methods, i.e. experimental, commonly-used or well-established, and purpose of the method, e.g. assessment and evaluation of impacts. Moreover, links guide the user to a detailed description of each method, as already discussed. This allows the decision-maker to get to know the method in greater depth so that the user has the opportunity to apply the method in the given situation. For a demonstration of the toolkit visit the following link: http://www.luda-europe.net/hb5/select.php

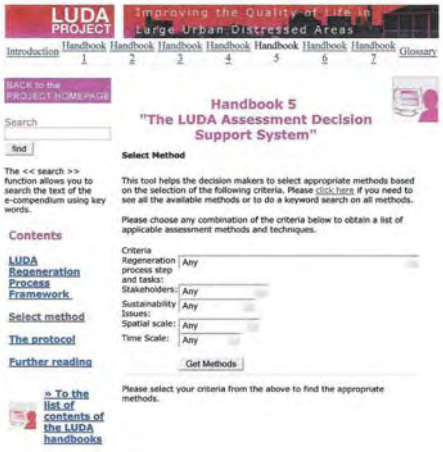

Figure 2: Screen shot of LUDA DSS interface

Method	Method Status	Main use of the method	Method Description
Analysis of Interconnected Decision Areas (AIDA)	Well-established	Aiding informed choices	View (in PDF format)
Community Impact Evaluation	Well-established	Assessment and evaluation of impacts	View (in PDF format)
Multi-Criteria Analysis (MCA)	Commonly used	Aiding informed choices based on a set of criteria	View (in PDF format)
Survey Questionnaires	Commonly used	Collecting and initial analysis of data	View (in PDF format

Table 3: List of methods relating to the selected example criteria

Conclusions

The LUDA Regeneration Process provides an innovative, comprehensive and flexible process that, due to its division into smaller tasks, provides an action plan for regeneration practitioners that can be followed in their day-to-day activities. At the same time, inclusion of the crucial elements of SEA and SA (e.g. impact assessment and development of objectives and targets) allows the practitioners to comply with the legal requirements for ex-ante assessment. The LUDA Regeneration Process is based on strategies successfully applied by the partner and reference cities, and, while it has not been applied as a whole in the regeneration of any of the cities participating in the LUDA project, the authors believe that this process can guide regeneration from the identification of problems to the final evaluation.

The LUDA Regeneration Framework provides an overview of critical issues that need to be taken into consideration in regeneration of LUDAs, to make the process more efficient and the outcomes more sustainable. Development of the LUDA Regeneration Process and Framework and selection of assessment methods applicable to regeneration of LUDAs resulted in creation of the online toolkit. The DSS toolkit has been designed for anyone involved in delivery or appraisal or regeneration initiatives; in particular including programme managers, advisors and consultants. For professionals and researchers it provides a comprehensive database of assessment methods and techniques for use in evaluating the sustainability of regeneration.

The DSS has been evaluated at workshop sessions held for this purpose towards the end of the LUDA project, when it was favourably received by regeneration professionals working in the LUDA case study cities and reference cities, especially the on-line toolkit, which was signalled as being simple and easy to use, and significant for aiding decision-making and progressing the sustainable assessment of LUDA's in their respective cities. The expectant outcome is the DSS will be extended in its use, so that the potential of sustainable urban regeneration assessment can be realised in cities across Europe. Further evaluations of its use will be necessary in order to prove its worth.

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Annex:

ASSESSMENT METHODS AND TECHNIQUES PRO-FORMA: Example of an assessment method description from the DSS

1. Name

Ecological Footprint

2. Description

General

Ecological Footprinting is a form of resource accounting, a way of assessing the compound effect of humanity's consumption of natural resources and generation of waste. It depends on the notion of carrying capacity which is defined as the maximum ‚load' (population x per capita impact) that can safely and persistently be imposed on the environment by people (Ref 1 & Ref 10). Any human settlement, a city, district or individual building can be considered from an ecological standpoint, in terms of its impact on the land area required to support it. A settlement can only completely sustainable if the land area required to support it can:

- generate all the resources necessary to service the pattern of land use involved, and
- render harmless any pollution arising from that use

without causing the area's long term viability to deteriorate (Ref 2). Continuing viability depends upon how much consumption and pollution the pattern of land use imposes and the efficiency of the prevailing technology (e.g. energy efficiency, waste minimisation, etc.). Formulated in this way, the sustainability of any human settlement depends on interaction between its level of demand and where the boundary of the area required to support it is drawn. The heavier the demand, the larger the land area required to support it. This external resource base is termed an ‚ecological footprint' (Ref 3). It is important to note that the footprint deals only with demands placed on the environment and does not attempt to include the social or economic dimensions of sustainability.

data requirements

(nature and source , i.e. quantitative, e.g. census data; qualitative, e.g. observation)

Ecological Footprinting of a city or a regeneration area will require access to extensive quantitative data on energy and material flows involved in the wide range of activities that take place there. The materials used for construction and maintenance of the fabric, the energy used in everyday activities in transport, heating and/or cooling buildings, the foodstuffs consumed by the population and the waste that is produced and discharged to the air, land and water.

A typical annual data set for a local footprint assessment would include (adapted from Ref 4):

- Population in the area
- Total land area occupied by the community
- Land use (areas of different types of land use)
- Fuel use by source (electricity, natural gas, coal, petroleum, biomass, etc.)
- Number of road vehicles and miles travelled
- Type, age and number of housing units
- Waste and recycling
- Food consumption
- Goods purchased
- Services used

Nevertheless in most circumstance for a regeneration area of a city, large assumptions have to be made normally through "top-down" extrapolation from national or regional input-output statistics, known as compound footprinting (Ref 5). Data can also be built up from considering all individual items of consumption e.g. from Life Cycle Analysis of products and components, known as component footprinting. In reality for a rehabilitation area of a city both methods of data acquisition are likely to be used.

status (well established, or experimental)

The idea of footprinting was created in 1993 by Wackernagel and Rees (Ref 6), and has been considerably developed over the decade since its inception. As international cooperation and data standards have developed the Ecological Footprint is becoming a well respected method in wide use by governments, communities, and businesses to monitor current ecological resource balances and to plan for the future. Increasingly advanced data capture and international cooperation means that good data sets now exist at the national or city scales for a wide range of the affluent countries and regions in Europe and North America and footprinting is being used to make comparisons between countries and cities. However, due to the assumptions and extrapolations that have to be made it is not without its detractors – explored in the swot analysis below. Its use as an environmental sustainability assessment at the scale of whole cities is increasingly common, but still relatively rare for assessing the impact of a rehabilitation area of a city district.

3. Evaluation step(s)*

As its primary role is to make explicit the environmental impact of the whole community Ecological Footprint is most appropriate to Step 1: Diagnosis and Step 5: Monitoring. However, as it is a form of resource accounting it can be used to assess anticipated changes to resource consumption as a result of the proposals included in a rehabilitation plan or programme (Stage 3 Programming). Simple forms of self assessment programmes are available (Ref 7) to enable individuals to assess their personal footprint which can help in enhancing citizen's awareness of the resource implications of their lifestyle – useful to Step 1 and Step 2 (Visioning)

4. Stakeholders*

a) applying the method;

Ecological Footprinting is usually undertaken by specialist consultants (or researchers) under the direction of planners and urban designers. There are simple self assessment software programmes available (Ref 7) that allow individual citizens assess their personal footprint.

b) the decision-making process

The output of Ecological Foorprinting is represented by a single indicator, i.e., the additional land surface needed to support the community. As such it is easily understood and used by all stakeholders. However action(s) to reduce the footprint will require interpretation by planners and

consultants for effective understanding by elected representatives and citizens.

5. Sustainability Issues*

Ecological Footprinting explicitly links Area 1 (land use) and environmental impacts - Area 4.

6. Scale of assessment*

a. space (the spatial dimension of the application)

Ecological Footprinting can be addressed at all the spatial scales. It is usually used at scales 3, 3 and 4

b. time (the temporal dimension covered by the application)

Ecological Footprinting analysis usually addresses annual statistics and so in terms of the assessment its time frame is short-term. However it is aimed at benchmarking the current consumption of the community, as represented by the footprint, with a view to setting targets for reducing consumption and reducing stress on the environment in the future. Therefore it has implications over medium-term and long-term timeframes.

7. SWOT analysis (strengths, weaknesses, opportunities, threats)

Strengths,

Ecological Footprinting aggregates the consumption of resources associated with a wide range of human activities to a single indicator – namely the surface area necessary to support the population in the community under consideration without degrading the environment. It makes explicit the degree of ecological overshoot, i.e., the additional amount of land and sea surface necessary to support a particular community. This makes Ecological Footprinting a powerful and resonant means of measuring and communicating environmental impact and sustainability (Ref 8). The concept is easily understood by non-specialists and this is very useful in helping to change citizen's attitudes to environmental degradation and more resource efficient lifestyles.

Weaknesses,

The main weaknesses of Footprinting are that it does not address all aspects of sustainability and does not make a complete inventory of all resource consumption, e.g., water consumption is not included, nor does it consider all of the possible pollutants. Data is often not in a form required for the analysis and has to be extrapolated. It has also been criticised due to the fact that the carrying capacity is assumed to be fixed. Clearly man's ingenuity and technical development can increase efficiency of resource use over time. Similarly agricultural production can be increases by technical developments.

Opportunities,

The expanding utilisation of Ecological Footprint internationally means that standards have to be harmonised in order to maintain its credibility and the validity and consistency of the results. The Global Footprint Network (Ref 8), has taken on the task of supporting the development of quality assurance standards to provide consistency in the way the method is applied regardless of where or by whom it is being used,

"ensuring that the value of this important tool for sustainability planning is not lost in a confusion of alternative calculation strategies, reliance on different data sets and conflicting claims regarding what the findings represent" (Ref 8)

Adoption of these emerging standards should lead to even more widespread adoption of the method and its increased effectiveness as a catalyst for a sustainable future.

Threats

Footprinting does not capture the value of a good quality environment. It estimates identify the minimum requirement for a sustainable existence and do not take full account of the quality of life

(Ref 9). Thus for those communities who aspire to a higher quality of life in the future the evaluation and interpretation of the results of an Ecological Footprint would need to take into account the increase in the footprint to allow for a higher quality of existence.

The lack of reliable, easily accessible data at the scale of action, i.e., subsection of a city make it a difficult and complex for the ordinary professional (planner or urban designer) to carry out unaided, without understanding all aspects of the methodology and / or employing specialist consultants.

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Provided by: Steve Curwell

Date: 31st March 2005

*See LUDA framework for criteria.

9.2.3 LUDA Project – A Governance Concept and Management Tool for Urban Redevelopment in Dresden's Weißeritz Area

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ABSTRACT

This contribution discusses the implementation of the LUDA approach in the "Weißeritz" case area by the Dresden City Planning Office and the results achieved so far. Special attention is given to the involvement of local stakeholders and the integration of quality of life aspects into the urban regeneration process.

Basically, the LUDA project served as platform for exchanging knowledge regarding urban regeneration in Large Urban Distressed Areas in a European context. In the Dresden case it was particularly used as a device to increase efficiency and steer political decision making towards improving the quality of life in the Weißeritz area. One important aspect of the LUDA project lays in strengthening the involvement of local stakeholders into the urban redevelopment scheme and therefore pioneering new kinds of relationships between public and community. Dresden used different methods and activities to awaken the community interest. The result is the community's long-term commitment, which is put in the core of measures to combat urban distress.

Introduction

Dresden, the capital of the Free State of Saxony, accommodates 496.000 inhabitants (2006) in an area of 328.3 km². With a population growth since 2000, the city goes with Potsdam and Leipzig against the general tendency of shrinkage in Eastern Germany. However, the former loss of population and structural changes after the re-unification of the German states left a serious legacy: no pressure for re-using urbanised land.

The Weißeritz area is located adjacent to the city centre in the south west of Dresden, along the Weißeritz River. With an area of 10 square km, it encompasses brownfields, abandoned railway tracks, workers' residential areas of the 19th/20th century, protected open spaces as well as massive road and rail infrastructure.

The LUDA project's holistic approach of urban regeneration, which is based on stakeholder participation and linked with quality of life issues, enabled Dresden, assisted by the IOER (Leibniz Institute of Ecological and Regional Development), to start a long-lasting process of improving the quality of life in this disadvantaged area.

This contribution discusses the implementation of the LUDA approach in the case area "Weißeritz" by the Dresden City Planning Office and the results achieved so far. Particular focus is put on active and long lasting community involvement into the urban redevelopment process and the linkage of several on-going projects that focus on different dimensions of quality of life.

The Weißeritz Case

The Weißeritz area in Dresden has deep-rooted and complex problems that make its regeneration an extremely challenging issue. Planners and politicians are under pressure to make changes towards better local quality of life. However traditional approaches and instruments of urban planning often are not suitable to produce effective, long-lasting, sustainable regeneration strategies.

Figure 1: The territory of the municipality of Dresden and in white the Weißeritz Area. Map: IÖR 2007

The Weißeritz area is located in the south west of the city (Figure 1), along the river Weißeritz –this conferred the name to the area. An important characteristic is that this area is not defined by administrative units, but consists of different portions of 9 adjacent urban districts. It has differentiated spatial features - from fallow industrial sites of 19th century to vacant office buildings from the building boom in 1990ies. Thus, the LUDA "Weißeritz" is a "planning construct", i.e. in the perception of the city's planner staff it forms a functional, problem-oriented unity, where multiple disadvantages are concentred. The Weißeritz area traditionally had an important role in Dresden's industrial history; from the 18th to the 20th century it was the city's main industrial sites and a residential area for workers, and both shaped the character of the area (Figure 2).

Nowadays, economic and demographic changes have a strong impact on features of the Weißeritz area. The loss of population and the structural economic changes within the last 17 years shaped the current picture of the Weißeritz area. Although currently enjoying the moderately growing population and economy found in the entire city, the Weißeritz area still suffers the dramatic changes of former years. This situation is most significantly mirrored by the low or non-existent pressure for land use by the private sector. One reason for this is the area's poor image, due to its destroyed urban structure caused by World War II and by giving up land uses in great quantities after 1990. The low demand on land use causes a large amount of wasteland, empty housing and land uses which are not appropriate for a central location within the city. As Weißeritz has failed to attract significant alternative employment, the regeneration of the area is aggravated by different problems: old industrial estates with contaminated land and refuse dumps, a former public and private priority setting for investments that was disadvantageous

Figure 2: Dresden Weißeritz – an impression. Photo: Dresden 2005

for the Weißeritz area, a lack of consent between property owners and city administration, and a weak involvement of private and public stakeholders.

The numerous brownfields are a problem to overcome, but they are also a potential, since they can be transformed into both permanent and intermediate used public open spaces and thus, serve the population for recreational and leisure activities. In fact, the revitalisation of this former industrial area is strongly linked to open space planning. The implementation of a green corridor connecting the city centre to Dresden's hinterland through the Weißeritz area, is seen as key project that together with others, e.g. the promotion of small and middle-sized enterprises, should support the revitalisation process. The green corridor is also a step towards changing the desolate character and the poor image of the area. Therefore, enhancing the quality of the open spaces is a building block of the urban development strategy. The still-existing remnants of urban structure such as parks, squares, industrial monuments and historical sites can serve as initials of investment and become a catalyst in the regeneration scheme.

The LUDA analysis of the area, based on the five LUDA dimensions of quality of life[1] , showed that large parts of Weißeritz are characterised by low public involvement. Thus and because local actions and stakeholders' active commitment were identified as a key driver to boost the rehabilitation process in large urban distressed areas, the LUDA approach for the regeneration of the Weißeritz area put the focus on community involvement.

The LUDA analyses also demonstrated that several projects and programmes running in the Weißeritz area focus on different dimensions of quality of life, but are rarely linked with each other, neither in the city administration nor in spatial terms in the area itself. Thus, the LUDA approach in Weißeritz provided also an umbrella for spatial and process-related integration through the linkage of different projects and programmes already running in the area.

Finally, the analyses of the area explored that LUDA Weißeritz is not in homogenous bad condition, but consists of adjacent "pockets" with problems and potentials related to all five dimensions of quality of life. Thus, also ascertaining the potentials in all dimensions and link those with the regeneration process became another issue in the Weißeritz area.

Activating community involvement

Fostering identification and involvement of local stakeholders was a key working field within the project. While active involvement of local stakeholders in urban regeneration processes is often a challenge on its own, the special challenge in this case was the largeness of the area (10 square km). Existing initiatives and associations were focussing only on spatial parts or special topics so far, rarely linked with each other and selective involved in city development issues.

At the beginning of the LUDA project mainly bilateral and project related contacts between the city administration and local stakeholders had been existing. Attempts to include latter actively into the planning process had rarely been undertaken until then. Instead local stakeholders had just been introduced in meetings to the city's future planning. Pretty often this became a balancing act for the city administration and politics, since local stakeholders felt their needs and concerns not incorporated. In order to avoid such situations in future, stakeholders should be merged in the context of the LUDA project actively and durably into the regeneration scheme. Target audience were local residents, small and medium enterprises, associations, citizens' initiatives and politicians.

1 Luda dimensions of quality of life are 'Socio-cultural Conditions', 'Economic Conditions', 'Urban Structure', 'Environmental Conditions' and 'Community and Institutional Capacity'. For detailed information see paper: Monitoring the Quality of Life in Urban Regeneration by C. Westphal.

To raise awareness for the Weißeritz area, the Dresden City Planning Office initiated as a first measure guided walking tours through different Weißeritz neighbourhoods. These tours aimed at arising public interest and establishing or strengthening the contacts. During the tours the participants were particularly informed about the existing potentials, often with historical value (e.g. industrial monuments, local recreational areas) and also about current developments and plans for the area (e.g. development of green corridor, measures for flood protection, progress in the rehabilitation scheme) (Figure 3). In this way several first contacts were made with different local stakeholders that had a potential interest in an involvement in urban regeneration issues.

Figure 3: Participants of the tour were informed by the staff of the City Planning Office about the planning activities. Photo: IÖR 2005

As a second action the Dresden City Planning Office promoted several exhibitions of student works. Presented were results from diploma thesis and semester projects that were dealing with the Weißeritz area, elaborated either by landscape architecture or geography students. This cooperation with Dresden's Universities was initiated to especially promote the potentials of the Weißeritz river banks as recreation and leisure area. Moreover, the results included useful ideas regarding designing details for different parts of the river.

Both activities aimed at sparking the interest of local stakeholders in their living and working environment and increasing the identification through emphasising the unique history and development potential of the area. Now it was time to go the next step.

Creating a Communication Platform

While the first activities served the information transfer in order to increase the interest of stakeholders in the redevelopment scheme, in the further course of the project another goal was set: strengthening the project as communication platform for the entire Weißeritz area. This should bring together a network of different public and private stakeholders, the different neighbourhoods and the different programmes and activities within the area. Among latter rank in particulary the different redevelopment areas, including several measures co-financed with resources from the European Regional Development Fund (ERDF) and other projects for flood management and historical sites protection as well as for promotion of economic and traffic infrastructure development

For this purpose the City Planning Office, the IOER, and the Office for Urban Management and Environmental Planning, which is in charge of the implementation of measures financed by ERDF funds, organised a series of workshops. In the five workshops representatives of different city administration departments, politicians, entrepreneurs, inhabitants and scientists discussed the revitalisation process and scheme.

The first workshop brought together all offices of the city administration with running programmes and projects in the LUDA Weißeritz. It targeted at exchanging information, exploring synergies and agreeing upon a common strategic procedure. The following workshops were organised as moderated discussion forums. Beside local stakeholders, experts from other cities with experiences in urban redevelopment schemes were also invited.

These workshops served under the slogan Stadtentwicklung im Dialog (Urban Development in Dialogue) to channel the different interests and suggestions on the improvement of the quality of life in Weißeritz (Figure 4). Themes treated were the promotion of economic development, the redevelopment of brownfields, green space development and the revitalisation of an isolated residential district.

Figure 4: Local stakeholders in dialogue with Dresden's city administration and researchers. Photo: IÖR 2005

All stakeholders very quickly came to the conclusion that this communication process opened new perspectives and chances for all parties involved. While the local participants could be comprehensively and directly informed about current planning, the city administration and politics got the opportunity to promote the goals and programmes, explain planning backgrounds and thus increase the acceptance for the intended measures.

During the second workshop a roundtable was created. This is a forum for all stakeholders interested in active participation in improvements towards better quality of life in Weißeritz. The first common project of this forum is a hiking trail trough the area linking its potentials and interesting places. To mark this trail over 20 information boards are being prepared, with contributions predominantly from the locals. To finance this trail both funding from the European Regional Development Fund (ERDF) and private sponsorships will be used. The idea of having regular roundtable meetings in different locations in the Weißeritz area, organised by the participants involved, also found good acceptance.

Today, this roundtable is already an institutionalised facility. Planners, politicians, entrepreneurs, inhabitants and scientists participated in the eleventh meeting in February 2007, long after the LUDA project ended.

LUDA as a Learning Process – Dresden's Experiences

The Dresden municipality has a guideline for the European work. It is the basis for the active co-operation of the city in European projects and networks. The city's principal purpose lays in the exchange of experience and knowledge among European partners. Within the LUDA project the City Planning Office could, in a period of three years, accompany and gain experiences of planning and development through the development of five other European large urban distressed areas.

The knowledge transfer in the project was enhanced via workshops and conferences, through the scientific evaluation exchange of the improvements in the six partner cities, and the analysis of further reference areas in twelve other cities. Although the approaches of other cities are not directly transferable to Dresden due to different frame conditions, they nevertheless serve as an important pool of experiences, on its basis own new ideas can be develop and carried out. To mention are in particular the enhanced knowledge on different procedures for integration of local stakeholders into the urban redevelopment process as well as strategies for urban redevelopment with small financial budgets or without financial supportive programmes.

Another exchange of knowledge within the LUDA project, in fact between stakeholders at local level, in this case within the Weißeritz area, was explored in this

article. The LUDA results of the scientific analyses, based on the five dimensions of quality of life, improved the empirical database of the City Planning Office, which represents an important base for preparing decision making. Conclusions from that analysis were the basis for several actions within the LUDA project, first of all aiming at community involvement.

Perhaps the most valuable experience made was the strengthening an active integration of local actors into the urban redevelopment scheme for the Weißeritz area. This happened through different ways, like guided tours and exhibitions. This way many participants could add their local-specific knowledge to the process. This was also an effect of the workshops. Apart from external experts' assessments, the detailed knowledge of the place by local actors could be considered in future planning activities. Finally, the regular roundtable, created by the LUDA project, is revealing as a long term activity, continuing with the exchange of ideas and knowledge. The detailed knowledge of participants about the Weißeritz area is still an issue of local capacity to mobilise potentials of the area.

Beyond these visible improvements, an added value of the LUDA project is its strategic approach to link urban redevelopment measures with aspects of the improvement of the quality of life. This linkage made obvious that there are no distressed areas with uniform problem constellation, as it appears when only one dimension is taken into account (normally urban structure). Past urban redevelopment programmes often proceeded from a homogeneous problem situation. Therefore, supportive programmes mostly have a limited sectoral approach, e.g. with slanted investment towards structural, technical and/or traffic infrastructure, acting on the wrong assumption that the improvements would automatically affect other dimensions. This one-sided orientation of programmes forces municipalities, among them Dresden, to little integrative procedures. The LUDA approach points out ways the necessary integration can be carried out, including rescaling the spatial dimension, understanding urban distressed areas not as homogeneous problem areas, and through linking together the different measures and projects that contributing to the improvement of the quality of life. This also includes shifting the priorities within the public administration, e.g. allowing administration staff to spend more work time for managing the contacts with local actors. Due to the strained personnel situation in the City Planning Office, this remains a big challenge in the future.

Finally, participating in the LUDA project also offered the city Dresden the possibility to act on European level, to strengthen the contact to other European large cities and participate in strategically important networks. For example, Dresden is participating in the urban regeneration group, initiated and led by the Municipality of Florence, in the Eurocities-Network.

LUDA Is More than Planning Regeneration - An Outlook

Many European cities need approaches, methods and instruments which can help their planners and politicians in the efforts to improve the quality of life in large urban distressed areas and to reintegrate these again into the urban fabric. To develop such impulses was the principal purpose of the LUDA project.

Dresden's urban regeneration scheme evidences two major results as project outcomes. First, the LUDA project opened new perspectives for urban development in Dresden by linking urban revitalisation efforts with aspects of the quality of life. The spatial structures and differentiation patterns of use and distress in Weißeritz underpin the LUDA approach, in particular the differentiation into the five dimensions of the quality of life. Then the LUDA methodological approach strongly relies on political and institutional advocacy.

And this is the second important aspect

of the LUDA project - strengthening the involvement of local stakeholders into the urban redevelopment scheme and pioneering new kinds of relationships between public and community. The community's long-term commitment is understood as a way to combat urban distress. This increased the effectiveness of the proposals and brought news issues onto the regeneration agenda.

Dresden additionally shows that without intensive financial expenditures, small but valuable accents can be set for improving the quality of life in urban distressed areas. This might be of interest in future urban redevelopment schemes, and not only in Dresden.

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