Name applicant: Steven van Beek

Student number: 3323293

E-mail: stevenvanbeek@gmail.com

Student address: Bolognalaan 15 J, 3584 CJ, Utrecht

Tel: 06 111-99-736

Programme: Sustainable Development

Track: Environmental Policy and Management

Internship: Yes
TAUW
Australiëlaan 5
Postbus 3015,
3502 GA Utrecht

Contact Tauw: Claude Roovers (claude.roovers@tauw.nl)
Cathrien Heusinkveld-Bakker (cathrien.heusinkveld@tauw.nl)

Thesis title: Urban Areas in Transition: Identifying fundamental features of urban integration through an analysis of sustainable soil management in the European Union

Supervisor: Mendel Giezen (M.Giezen@uu.nl)

Number of ECTS: 30

Start date research proposal: May 30, 2012

Acknowledgments:
This thesis represents the concluding work in my study. The work seen here represent a long journey which has seen ups and downs. Using theories and concepts to deconstruct the real-world throughout my study has been self-fulfilling, yet challenging. The reader of this thesis should be aware that I support the idea of understanding problems in a holistic way and that this requires simplicity. Simplifying real-world patterns not only contributes knowledge to those in the intellectual sphere, but also helps the average human-being at understanding the roots of complexity.
Similar to this research I have tried to organize my life to see the big picture and simplify it. This has particularly motivated me to conduct this research which required a thorough analysis of the holistic aspects of integrative urban development approaches.

Here I would like to thank some people who have contributed to the realization of this thesis. Foremost I am grateful those people at Tauw, Claude Roovers and Cathrien Heusinkveld-Bakker, who accepted me on board of their team. The internship opportunity with Tauw helped me grow in many ways. I am also particularly grateful to my supervisor Mendel Giezen for critically commenting my work and especially for providing moral support throughout the process.

Finally, I am thankful to my family and friends - Melanie Johnson, Eveline van Beek, Monique van Beek, Jenny Klein Nulend, Campo van Beek, Gerke van Beek - for providing encouragement and believing in me. My squash club, for the crucial inspirational speeches, and all those that have helped me along the way.

Thank you for helping me explore the simplicity of complexity.

Summary:
This research will take a close look at the governance system required for soil policy integration in urban redevelopment. In doing so it will investigate the process and output factors that contribute to sustainable soil management. This research will provide descriptive information on what is meant by an integrated approach, and in which way urban developments can include and improve soil management in such an approach. From the literature, a profile is sketched of an ideal governance arrangement that contributes to an integrated urban development approach which also contributes to sustainable soil management.

Using the ideal profile sketch this research provides evaluative knowledge of real-world urban redevelopment project cases which examines the level of integration and measures applied for sustainable soil management in order to identify crucial areas of success. A case study approach is used where various actors (contractors, local governments, private parties and members of the public) are interviewed. The aim is to identify and explain successful integrated urban development strategies at the city level in European areas to improve the future design of sustainable integrated urban development policies that will take on board proper soil management.

The research will be helpful because it can provide various stakeholders worldwide with a relatively good overview of current practices regarding an integrated approach in urban development and provide suggestions on ensuring that sustainable soil management forms part of an integrated approach in urban (re)development.

Key concepts: integrated urban development, sustainable development, governance, success factors

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

This thesis is structured as follows. The introduction in chapter 1 is followed the methodology in chapter 2. Following the methodology is a description of relevant theories and concepts. This is followed by chapter 4 where the research design and strategy are developed. Included in this chapter is a description of important variables gathered from the theories and concepts and workshop which are operationalized such that these can be systematically collected and evaluated in the case studies. Finally four case studies are explained and evaluated, according to the systematic evaluations, in chapters 5, 6, 7 and 8. Chapter 9 provides a final case study comparison providing an overview of key findings. Chapter 10 will provide some overall conclusions and provide some recommendations with regards to applying an integrative urban development approach with soil management in practice. Finally chapter 11 will reflect on the research and the methodology and some of the theories in order to provide recommendations for future research.

This research has been commissioned by Tauw on behalf of Citychlor, who aim to achieve an *integrated urban development approach*, inclusive of sustainable soil management. Soils are an important environmental feature, which provide many benefits to humans in social and economic terms. 'Good soils' for example provide a basis for crops to grow which in turn results in economic benefits. This is but one example of the benefits of good soils. Evidence from studies conducted by the EU and soil experts however point to the rapid degradation of soils which could cause uncalled frictions in the economic and social spheres.

Soil degradation is especially prominent in urban areas where pressures from urbanization greatly contribute to the pace at which soils are degraded. Having instilled many policies for soils in rural areas, especially for farmers, proper soil management in cities seems to be lacking. Many soils in densely populated cities are now, more than ever, suffering from the pressures of urbanization which have excessively polluted or compacted soils, subsequently limiting their functions. The limiting of soil functions in the urban environment has far reaching consequences, affecting the socio-economic and ecological relations in the environment.

In response to degrading soil qualities in urban areas and the need for more sustainable urban development, the concept of *'integrated urban development'* was developed. Part of this concept is geared towards establishing linkages across socio-economic and ecological spheres to avoid unsustainable urban development. As more pressures are expected to be exerted on urban soils due to an increasing number of people moving to cities, environmental standards have gradually been tightened since the 1970s with the recognition of sustainable development. However, despite some ambitious policy objectives regarding sustainable soils, there remains a gap between the theory of realizing sustainable soil management at the urban level, and the realities of putting policies and schemes into practice. The approach used in this research consists therefore not only of a detailed literature review on sustainable soil management in urban development, but also of a case study analysis to better understand and minimize the gap between theory and practice.

The study of Environmental Policy Integration (EPI), which can be defined as an *"early coordination between sector and environmental objectives, in order to find synergies between the two or to set priorities for the environment, where necessary*" (Hey, 2002, p.127 in Persson 2004) includes relevant theories that will be addressed in this research. It represents an important principle and procedure for developing environmentally balanced sustainable urban societies. First it promotes the development of an integrated urban development approach that requires dialogue, broad horizons and collaborative working between actors. Second, the procedure is relevant in this research because it promotes the integration of environmental objectives, such as soils. The case studies chosen for this research consist of European redevelopment projects in The Netherlands, Belgium, Germany and France. One of the most important criteria while choosing cases in each of these countries is that they have ties to CityChlor.

The EU Project CityChlor is a transnational cooperation project with the overarching goal of developing an integrated approach to improve the soil and ground water quality and the minimization of pollution caused by volatile chlorinated hydrocarbons (CHC) in urban areas. An integrated approach in policy represents a concept that relies on creating horizontal, vertical and diagonal coordination and linkages through sectors. With respect to urban development an integrated approach involves opening up dialogue between larger varieties of stakeholders in order to broaden their horizons in a collaborative fashion. This in turn will help to implement new innovative strategies that account for a greater number of sustainability issues. The Leipzig Charter represents an important step in recognizing the benefits of integrated urban development. It was an initiative put forth during the German EU presidency of 2007, and it advocates for European structural funds to be made

available for local projects that embrace the integral approach. It suggested that integrated approaches should be understood as a spatial, temporal and thematic coordination and integration of different policy areas for action and sectorial planning, through which precise goals should be defined by (financial) instruments (BVBS, 2012, p.17). An early and full implication of all relevant stakeholders for sustainable urban development – including those beyond the political and administrative realm, such as the civil society and economic actors, and especially the local population – also plays a prominent role (BVBS, 2012).

In order to narrow the broad concept of 'integration' as described above the case studies chosen consist of minimal variation in terms of theme (station area projects), and temporal coordination (project development phase). This means that the focus of integration in this research lies in examining the effect of governance arrangements consisting of coordination, tools and resources to ensure sustainable soil management.

Reading guide:

This research consists of two main parts: A literature review (chapter 2) and a case study analysis (chapters 5, 6, 7 & 8).

The first chapter will further detail the importance of proper sustainable soil management (Background Information), describe the problem (problem definition), explore the knowledge gap, develop the research objectives, define the appropriate research question for this research and finally report the research approach its relevance and delimitations.

Chapter 2 provides a brief description of the methodology applied in this research. It explains the key elements that contributed to obtaining the necessary information for making final conclusions in the research.

Chapter 3 explains theories and concepts. It examines urban integration in more detail and its relevance for sustainable urban development. Also the first part of the analysis will explain what is meant by soil management and provide information on defining proper soil management. Finally the chapter will investigate how EPI works and connect it to governance to provide information on what measures and tools are necessary to contribute to sustainable soil management, which is in line with the ultimate goal of CityChlor. In the end the literature review will present a framework with which to structurally examine the case studies.

Chapter 4 describes in detail the research approach & strategy. It consists of a description of the case study, and its design. Also included is the operationalization of key variables of the research framework to be used for examining the case studies.

Chapters 5, 6, 7 & 8: The case studies are used to add knowledge to the literature by clarifying which measures related to research framework have promoted urban integration and resulted in sustainable soil management in urban development. In the end a comparison of the case studies will allow for an evaluation of elements that are deemed most important for ensuring a successful integrated approach with soil considerations.

Chapter 9 provides a final case study comparison providing an overview of key findings.

Chapter 10 consists of final conclusions and will provide recommendations for integrating soil management in urban development.

Finally chapter 11 will reflect on the research methodology and describe possibilities for future research.

1.1 Background Information

This part of the thesis provides a general description of why sustainable urban soil management is relevant. Pressures on soils resulting from urbanization have degraded the full potential use of soils in urban environments and have also led to social and economic frictions. As such, finding ways to redevelop urban areas without compromising on soil issues is important. It is concluded that an understanding of actor relationships and responsibilities will help to determine how to ensure successful EPI so that sustainable soil management will pursue in urban redevelopment.

At present the rate of urbanization worldwide is increasing dramatically. People migrate from rural to urban areas in search of jobs and a generally perceived better quality of life. Indeed in Europe cities are the engines of economic growth. As stated by the European commission [EC], cities with *"more than one million inhabitants generate 25% more GDP than the EU average (…) and 40% higher GDP than their home nation´s national average"* (EC, 2009, p.7). It comes as no surprise then that around 50% of the world´s population lives in cities and this is an increasing trend (MDG, 2007, p.27). In fact, by 2030 an estimated 5 billion people will live in urban environments (Ibid.: 2007, p.27). Increasing urbanization raises many issues in terms of urban sustainability due to increasing pressures, and it can lead to increased CO_2 emissions, air, noise and water pollution, alters land-use, degrades biodiversity, and causes urban heat islands, making urban areas hot spots driving global climate change and potentially degrading the overall quality of life of people living and working in cities (Grimm et al., 2008). A common criticism found in the field of urban development is that different cities and different people in the urban development scene often set different agendas in relation to sustainability problems (Campbell, 1996). Normatively, sustainability covers three main dimensions; people, planet and prosperity. Each of these dimensions requires different measures to be put into place, but a lack of collaboration between agenda items can quickly lead to poor planning and management, hence unsustainable urban development.

Management and planning processes in urban development have often witnessed insufficient collaborative efforts (Campbell, 1996). Consequently this has had adverse effects on the functioning and use of soil in urban areas, both as a useful resource for technological purposes such as heat and cold storage or other sorts of storage and transport systems, but also as an ecosystem resource. On the one hand many soils in the urban environment have become polluted due to contaminants released from industrial sources and other types of household waste. Over time these contaminants have become mixed in the ecosystem in the bodies of soil or in groundwater. The effect of this is contaminated plumes in the ground, which changes soil properties and the ability to maximize the use of those properties. Polluted soils also form a risk for receptors that extract resources from the ground or develop new projects on the polluted sites [see figure 1.1-1: Scheme of pollution in the ground]. On the other hand poor management and planning has had an effect on space in the ground thereby limiting the full potential use of the soil. Cables and sewers have been placed in an uncoordinated fashion, sometimes limiting further development and innovation practices in urbanized areas due to the high costs involved in relocating those infrastructure systems.

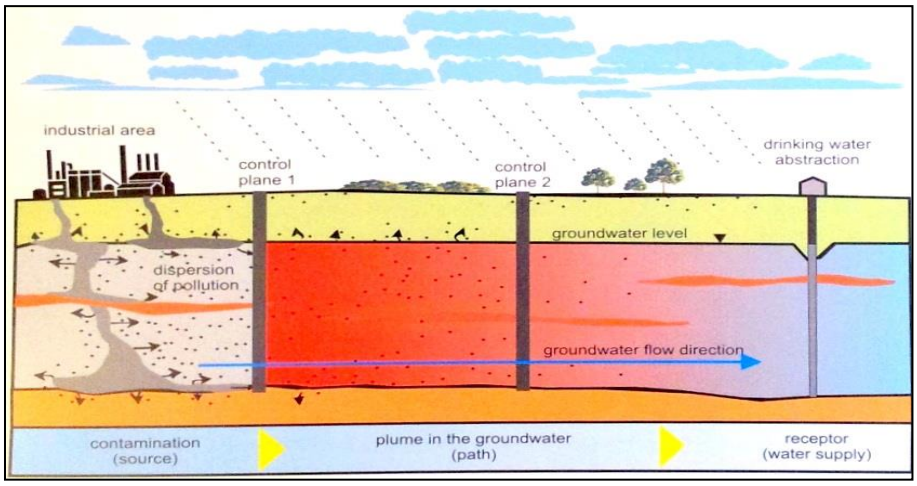


Figure 1.1-1: Scheme of pollution in the ground (FOKS, 2009)

Soils are important because they provide a wide range of ecosystem functions (Pickett et al., 2001; Swartjes et al., 2012). They offer habitats for biodiversity below and above ground as they retain and supply nutrients (Pickett et al., 2001). In addition the larger function of soil is to help clean water which replenishes aquifers which play a role in regulating microclimatic conditions, such as present in urban areas (Ibid.: 2001). Good soil also helps to provide aesthetic functions through landscaping. For humans specifically certain soil properties can provide ideal storage locations for infrastructure or infrastructure can be developed to use the properties of the soil.

Soil is a product of complex interactions between climate, geological processes, vegetation, ecological activities, time, and the use by humans (Ademe, 2012). Soil actually fulfills a multitude of functions which are vital for life on earth due to interdependencies (Ibid.: 2012). In the environmental sense soils help to regulate the environment, through storing water, holding pollutants and housing biodiversity. From an economical perspective soil helps businesses such as agriculture and forestry, but also resources found within soils are valuable. From a social and cultural perspective soil is important to support human activities and is also a key element in shaping the landscape.

Unfortunately, like many resources on Earth, soil is a non-renewable one. Proper management of such a resource is therefore important. In fact, because degradation of soil can occur fast, and the recovery and regeneration of soil is a process that is slow and takes thousands of years, proper soil management is gaining attention.

1.2 Problem Definition

Increased urbanization and industrialization have had adverse effects by changing the properties of soils consequently affecting the functions of soil and forming risks for the surrounding environment. Direct effects include physical disturbances, while indirect effects include change in the abiotic and biotic environment which can influence soil development (Pickett, et al., 2001). Soil sealing is one effect, which means that the ecological soil functions are severely impaired or even prevented, for example soil working as a buffer and filter system or as a carbon sink (EC-JRC, 2012). It is important to note that surrounding soils may be influenced, and this causes changes in water flow patterns or the fragmentation of habitats in the larger landscape. Not only can this lead to common issues such as flooding, but the spreading of contaminants through the soil can also pose health threats to humans. The wider problem is that soil loses its properties when not managed properly, the effect being that humans can no longer use the soil for purposes of social or economic wellbeing. Current studies suggest that soil sealing is nearly irreversible (EC-JRC, 2012) and therefore it should be considered a pressing issue and included in an integrated urban development approach.

The common term adopted for contaminated and unsustainable sites with the presence of soil sealing, is 'brownfield'. While many countries adopt their own definitions of brownfield sites one of the more recognized ones stems from CABERNET (2012) who define it as *"abandoned or underused properties, for which intervention is required to ensure beneficial reuse because of the real or suspected presence of hazardous substances, pollutants or contaminants"*. In this research the term 'brownfield' will be used when necessary to describe polluted project sites and sites where soil properties are not utilized because of planning and management issues which have restricted the use of the soil.

As sustainable development has become a widely accepted principle many cities globally are now focusing on employing sustainable measures, in part to cope with adverse effects from climate change (Jim, 2004). A number of measures, diverse in nature, ranging from efforts to secure water supplies and energy supplies, adjusting building codes and greening the landscape have been implemented (Jim, 2004). Yet a set of measures that specifically targets soil management in the larger scheme of urban redevelopment have not been developed or implemented on a large scale, and therefore there is still an occurrence of brownfield sites in urban areas and other processes that limit the functioning of soils. One of the most common issues for the lack of soil management in urban areas is in part due to the spread of pollutants over a large area, and the inability to trace the polluter or realize the actual impact of pollutants. As such it is recognized by authors such as Schadler et al. (2011) and Linkov et al. (2006) that successful redevelopment can only be achieved in an adaptive manner. This means that proper soil management can no longer solely consist of finding the original polluter to deal with the externalities but instead requires flexibility to deal with pollution more effectively. These authors suggest that an adaptive method must optimize the trade-off between economically prized remediation scenarios and maximized economic benefits within a socio-economic framework to ensure sustainable urban and regional development (De Sousa, 2006; Schadler et al., 2011).

It is now time to make progress on how to successfully manage the urban environment in a more sustainable way than at present, and that means that soil issues should be addressed within a logical socio-

economic framework. This can be done by creating a more integrated process for urban development where knowledge on soil management, including understanding the ecological patterns and processes of soil in urban environments is needed. By mainstreaming soil issues in an integrated approach urban areas will become more sustainable. This is especially important considering the irreversible effects of polluted soils.

In order to increase the level of integration for soil sustainability in management processes governance plays a central role, which essentially entails investigating relationships and responsibilities across actors, namely the state, market and civil society. These actors are connected in various forms, such as direct partnership relations but also as network configurations (Jordan, 2008). Those interactions between key agents will be a main focus throughout this research as it is expected that they influence the implementation of an integrated approach. Other features which determine integration and are not mutually exclusive from governance include project scope i.e. total project area, and available project funds. These features are expected to have an effect on sustainable urban soil management as they relate to the principle of integration which aims to contribute a wider or larger perspective to current development practices in the hope of developing innovative solutions.

1.3 Knowledge Gap

The ongoing debates in urban planning and urban (re)development involve planning and management issues as stakeholders "think in different languages". Spatial designers, real estate developers and environmental experts usually tend to have different priorities resulting in a lack of integration at the project level and also insufficient soil sustainability management. Indeed, according to literature in the field of urban development, the main problems of the development of urban areas may be how to accomplish the following (Bekkering et al., 1998; Hulsbergen & Stouten, 2001):

- An integrated approach (versus simplistic problem definitions and mono approaches)
- Multi-functionality (versus mono-functionality e.g. only housing)
- Mixed land use (versus one-sided use; a variety of functions and groups with alternating uses without conflicts)
- Local synergy (initiatives that stimulate other initiatives)
- Partnerships, like public-private, public-public and private-private

Each of the above problems deals at some level with the arrangement of actors and how they interact with each other. In present day urban development one can simply no longer function without cooperation and collaboration within and between actors from public and private parties (van der Veen & Korthals Altes, 2011). Keeping all of the above in mind, it is necessary to examine the current level of integration that takes place during urban development, focusing specifically on the governance of soil management in urban (re)development, to find out if key steps that should be taken are being taken.

In turn this will help to prescribe necessary adjustments for future projects on how to manage an integrated approach in urban development, which is inclusive of soil management, more successfully. Overall it is expected that an integrated an approach which relies on a networked governance structure that involves public and private actors is less likely to produce only partial solutions with regards to soil sustainability issues in the urban environment.

1.4 Research Objective(s)

The EU has recognized that soil degradation is leading to a wide scope of issues (EEA, 2010). Moreover the EU has recognized that although policies for water, waste, chemicals, industrial pollution prevention, nature protection, pesticides and agriculture are contributing to soil protection the policies have other aims and other scopes of action, and thus they are not sufficient to ensure an adequate level of protection for all soil in Europe. Furthermore, the prevention of soil degradation is also limited by the scarcity of data.

The objective of this research is to provide descriptive, evaluative and explanatory knowledge on the factors that contribute to an effective integrated approach that promotes the sustainable management of soil during urban (re)development projects. The aim is to provide a research that describes an ideal governance typology for the integration of sustainable soil management, and compares and contrasts this to practical examples. The practical examples consist of current urban redevelopment projects and will help to provide a prescriptive manual of steps that must be taken to ensure sustainable soil management in an integrated

approach during urban (re)development. Some main contrasts between the case studies will be inevitable, including project scope i.e. total project area, and total available funds available for development. These contrasts should however also add to the debate on essential features of an integrated approach.

Overall the research will provide data on the most common institutional and contextual problems found during urban (re)development projects that hinder or promote an integrated approach that is inclusive of sustainable soil management. By exploring the governance patterns for soil management in different settings, this thesis hopes to generate a better understanding of the most effective factors that are commonly applied to ensure integration.

1.5 Main Research Question(s)

"What factors in an integrated urban management approach contribute to sustainable soil management during urban redevelopment?"

In order to answer the main research question theory and practice are combined. The theory is used to set the stage on how to promote sustainable soil development in the process of urban development. The practice-based part of the research, which consists of case studies, is used to investigate best-practices.

By contrasting the literature with the case studies it is expected that it is possible to find opportunities and barriers to implementing an integrated approach that is inclusive of sustainable soil management.

Sub-questions:

1. What policy and governance factors are considered important to enable the integration of soil considerations in urban development?

Theory:

- What is meant by an integrated approach and how does it relate to sustainable urban development
- How can soil be managed sustainably
- What policy and governance factors enable soil integration
- How can soil be managed sustainably through an integrated approach

Practice-based:

- What ambition do governments have for soil management at the local /regional level
- What measures and instruments can be identified with regards to sustainable soil management
- How are governments at the local level striving for integration
- What results were achieved
- How was the process organized and executed
- What is the applied mode of governance

2. What are the opportunities and barriers for implementing an integrated approach that is inclusive of sustainable soil management in urban areas?

1.6 Research Approach

The research approach is further elaborated in chapter 4 'Research Design and Strategy' where an overview of criteria for case study selection is provided. The aim of this thesis is to gather information on factors that contribute to an effective integrated approach level for the sustainable management of soil. In order to understand the success factors of an integrated approach for soil management the research delves into the literature on the development of the concept of urban integration and combines this with a historical and multi-level governance practical case study analysis of how it has been implemented. The research is reliant on practice-based research and makes use of a predominantly qualitative case study methodology.

The development of an analytical framework - based on information gathered from literature, expert interviews and a work shop - was used to study the chosen case studies of urban redevelopments in a systematic way as is depicted in figure 1.6-1.

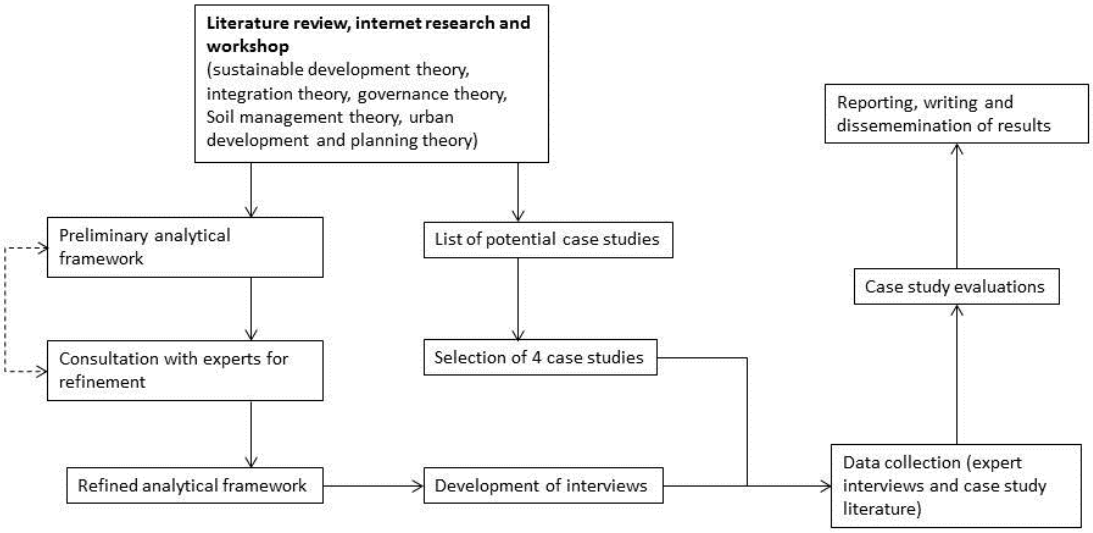


Figure 1.6-1: Research Approach (adopted from Toussaint, R., 2012)

1.7 Relevance and Delimitations

1.7.1 Societal Relevance

Several projections have been made by professionals in the field of urban development, speculating about the ongoing growth of population in cities. As more people move to live and work in cities the environmental effects of urbanization will quickly become apparent. The expected growth of cities, one can say, puts an emphasis on the importance of developing strategies that can cope with externalities, such as soil pollution. A research that monitors the current level of integration policies that incorporate soil management, and evaluates it, provides valuable information for future city development initiatives. In essence this research can be used to show what opportunities and barriers cities are facing and can be expected to face policy-wise when it comes to integrating policies to obtain more sustainable soil management.

This research is particularly relevant because it compares cities with different soil policy integration strategies and tools, and will help to understand how these will translate into effective mitigation and adaptation policies in an integrated approach. When completed, this research will be able to provide a clear overview of the advantages and disadvantages of different strategies by distinguishing between effective and ineffective measures based on the impact and scope of the implemented practices. Overall, by conducting this research data will be provided that can stimulate innovative policy changes across a range of actors involved in city development and help steer them to implement more successful integrated urban development initiatives that take into account sustainable soil management issues.

1.7.2 Scientific Relevance

As (Stroganova et al., 1995) observe, the functions of soils in urban areas are particularly important because of their proximity to humans. The risk of dangerous substances passing through the human body through inhalation, ingestion, and dermal contact (Abrahams, 2002 in Vršča et al., 2008) is higher than in agricultural or natural settings. As soil is an important component of urban ecosystems, its quality must be recognized and integrated into environmental quality management and sustained at an appropriate level (Vršča et al., 2008). Although other environmental factors have been recognized as essential components of city sustainability (Ravetz, 2000) and quality of life (van Kamp et al., 2003), soil quality information is generally overlooked at the time of land use planning (Vršča et al., 2008). This is due to the high social and economic pressure that makes soil only a consideration in terms of being a surface for buildings or a space for development. However, it is also because of an existing inefficiency in transferring information to stakeholders (Brown, 2003 in Vršča et al., 2008).

This research aims to contribute to the knowledge required to closing the gap between the “different languages” spoken in urban redevelopment and the associated consequences thereof for soil. By doing so, this

research contributes to the needed evidence base of best practices regarding integration for sustainable soils in urban areas, and the diffusion of those best practices by providing an overview of key factors shaping their success.

The research connects to the theoretical debate on the requirement for the identification of governance approaches in sustainable development initiatives such as 'integration'. The term 'governance', used to signify an order of rule that is more participatory and relies on creating social support for policy measures, relates directly to integration. By including an analysis of different governance approaches in integrated soil policy strategies, this report identifies the most important governance features required to achieve more sustainable urban development.

1.7.3 Delimitations

This research has a number of delimitations related to the availability of resources, the chosen research strategy, the scope of the research and researcher bias. A first delimitation of the research involves the scope and strategy, which limits itself to the investigation of integration within urban redevelopment in European partner cities with CityChlor links. Apart from the obvious geographical limitation, the focus on sustainable soil management forms another delimitation. Specific integration measures aimed at other environmental objectives such as air, energy and water are not explicitly included in the research, though they are recognized as valuable components in the whole scheme of sustainable integrated urban redevelopment. The available resources for the case studies, consisting of interviews also has drawbacks. Some of the answers provided in the interviews are open to interpretation, while at the same time the information gathered from interviews is also dependent on the knowledge of those being interviewed. A systematic research approach is used to overcome the limitations mentioned, yet it is still necessary to be aware in which ways the research could be affected.

Chapter 2: Methodology

2.1 Workshop:

A workshop held in Stuttgart on June 12, 2012 was the initial starting point of this research. Experts in different fields of urban development & planning came together to discuss common issues in urban (re)development encountered from three different sustainability perspectives; people, planet, prosperity. The insights gained from the experts helped to understand the main difficulties to make urban (re)development more integrated. Some of the main themes that were drawn from the workshop include; fuzzy objectives and rules in urban development, incomplete understanding of actors their resources and power, insufficient knowledge, and too few interactions between actors.

See appendix 5 for all workshop results.

The workshop as a whole is a useful element in this research as it provided a starting point for a further more elaborate literature review. It was used to link themes with each other on important integrated soil management efforts across Europe and compare these to the literature.

2.2 Literature Review:

In research it is important to have a complete understanding of the problem, as well as a good understanding of old and new developments that have excelled to overcome the problem. A literature review on key theories and concepts in this research helps to shed light on the ways in which environmental concerns have been addressed in urban development and planning, and why. A thorough review of (E)PI for example which is included in this research helps to identify criteria to be operationalized and used in this research in order to study sustainable integrated soil management.

In this research the assumption is made that governance and project scale (independent variables) influences the level of sustainable integrated soil management (dependent variable). An overview of governance and sustainable development literature therefore serves to highlight key features that determine what factors lead to a higher level of sustainable integrated soil management.

The knowledge gained from the literature review in chapter 3 forms the basis of the assessment of the case studies. The literature provides criteria which can be used to assess the level of sustainable integrated soil management in practice and determine what factors are missing or of importance to ensure integrated sustainable soil management. The knowledge gained from the literature will be applied to the case studies to provide important information on how to study features that can enhance the level of EPI and soil management in practice, or alternatively, what can be done to do this.

2.3 Case studies:

After identifying key features of sustainable development and planning, (E)PI and governance that contribute to sustainable soil management and that can be measured using operationalized criteria, case studies will be used to test the theories and concepts. In this way the research is practical and will add knowledge to the lack of evaluative and explanatory studies in relation to these theories and concepts.

Case study design:

This research makes use of a comparative case study based approach between various ongoing urban (re)development projects in the European Union which aim to improve their sustainability. An important criteria in this research that investigates soil sustainability is that the chosen case studies have a project partner linked to CityChlor [see http://citychlor.eu/project-partners]. CityChlor aims to improve soil sustainability and a linkage between the projects and CityChlor is deemed important because it suggests that soil is one objective in the redevelopment.

An attempt is made to minimize certain contextual variations between the cases in order to best understand what governance and elements related to scale are the most influential in promoting sustainable integrated urban development with soil management. The chosen projects will therefore be at the same

development phase (see figure 2.3-1). Similarly the thematic difference is also minimized by choosing redevelopment projects of station areas. In total four case studies will be aimed for.

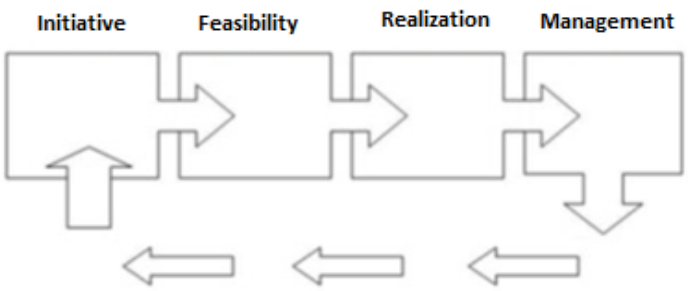


Figure 2.3-1: Phases in urban development (adopted from VROM, 2009)

Chapter 3: Theories & Concepts

Theories and concepts form the basis of the analytical framework to be used in this research for an analysis of current urban redevelopments. The analytical framework comprised of themes, aims to combine elements of the literature on sustainable development, policy integration, soil management, urban development and environmental governance to determine what is needed for a high level of integration in urban development that includes soil management. The literature review approach sketches the need to include elements of historical analysis with a multi-level perspective on governance arrangements to analyze the practical implementation of urban integration.

Through providing an overview of characteristic and ideal factors for an integrated approach that takes on board sustainable soil management issues, the analytical framework derived from the literature formed the basis for further desk-research and field-research in four case studies in European CityChlor partner cities. In the practical part of this thesis, integrated soil management approaches will be assessed in different settings, detailing their successes and limitations.

3.1 Introduction

Historically various actors involved in urban (re)development have worked independently carrying out their own individual tasks without considering the bigger picture and the interaction of their projects with the landscape and environment as a whole. The result of 'fragmented' actors in urban planning and development not collaborating in practice, and setting different objectives, comes at the high cost of uncontrolled infrastructural developments that limit the full potential and use of urban soils; which leads to unsustainable urban development. Processes to overcome the resulting brownfields and uncontrolled infrastructural developments are costly, complicated and time-consuming because they require remediation. Remediation of soil usually comes paired with extensive investigation, negotiation with different stakeholders with differing interests, uncertainties, and costs which may outweigh the benefits (Schadler et al., 2011). Relocating infrastructural developments such as pipes and cables is also costly and complicated, mostly due to the same reasons as mentioned afore. As such it is of essence that prior to physical urban development processes plans sufficiently consider the proper management of soils in order to avoid the longer-term consequences.

Fragmentation in urban development is the cause for unsustainable development and the lack of soil management. Interestingly fragmentation greatly reflects a 'tragedy of the commons' situation and is therefore in stark contrast to what is often prescribed in the literature on sustainable development. The tragedy of the commons is a theory conceptualized by Garrett Hardin in 1968 to explain the depletion of a shared resource by individuals, acting independently and rationally according to each one's self-interest, despite their understanding that depleting the common resource is contrary to their long-term best interests. In the case of urban redevelopment, whether individual actors have an understanding that soil depletion is contrary to long-term benefits and interests may be questioned because it is still occurring.

During urban redevelopment fragmentation between actors on soil issues also leads to stagnation in building and planning. Often soil pollution is the result of other actors' developments in the past. The most widely adopted principle to deal with soil pollution is the 'polluter pays'. This principle is an environmental law which is enacted to make the party responsible for producing pollution responsible for paying for the damage done to the natural environment. Since its development, the use of the polluter pays principle has received much support from the Organization for Economic Co-operation and Development (OECD) and European Community (EC) countries. Yet the applicability of such a principle is difficult in certain circumstances for a number of reasons; the polluter cannot be identified, the pollution case is too old, the pollution was within allowable limits at the time. Such circumstances lead to fragmentation to new urban redevelopments, with questions about new pollution limits and questions about the responsibility for the current pollution.

The next parts of this chapter will examine the theories and concepts behind sustainable development, urban development, soil management and (environmental) policy integration, thereby discerning the ideal governance arrangements that would decrease fragmentation and the thereof resulting stagnation of urban redevelopment.

3.2 Developing Sustainable Integrated Soil Management in Urban Development

"What is meant by an integrated approach and how does it relate to sustainable urban development"

3.2.1 Conceptualizing Sustainable Development in urban development

Urban development in this research is approached generically. It includes buildings and infrastructural developments such as cables, pipes, roads and so on. Previous research has conceptualized the process of urban development in 4 distinct phases. These phases are 1) initiative, 2) feasibility, 3) realization, and 4) management (see figure 5).

Analyzing urban development through different phases allows us to understand the particular governance configurations and characteristics at a point in time. The first phase includes the initiative phase which involves the identification of problems and the scope of them and developing a concept on how to deal with the issues with the available knowledge. The second phase involves ensuring that initiatives to overcome the problems are feasible. These first two steps are recognized as the most important and can be categorized as 'planning'. The realization phase involves the physical action of building and/or redeveloping. The final phase is the fourth phase which involves the management of the realized project.

While sustainable development can be conceptualized in numerous ways, in this thesis the basic concept of the balancing of three pillars is used (economy, environment and society). This conceptualization was chosen because socio-economic and environmental linkages are very present in the urban environment, and this conceptualization reflects on all aspects. It assumes that sustainable development is achieved through dialogue with parties from different pillars in order to safeguard long-term interests. This is in line with one the most well-known definitions of sustainable development, which reads: *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*. The issue of sustainable development resulted as a logical extension of arguments in environmental literature in the 1960s, 1970s and early 1980s (Robinson, 2004, p.370). The concept of sustainable development aims to promote economic and social welfare along with the preservation of global ecological systems for present and future generations (Meadowcroft, 2007, p.302). To do this, the concept stipulates the need for multiple parties to come together to discuss their interests and needs and come to mutual agreements with each other such that the negative impacts on global ecological systems for present and future generations is minimized. Four underlying sustainable development principles are now recognized globally. These principles can be referred to as those of environment, equity, participation and futurity which lead to the following guidelines of sustainable development (Bentivegna et al., 2002):

- Renewable resources must not be consumed faster than the rate at which they are renewed
- Non-renewable resources must not be consumed at a rate faster than that which they can be substituted for by a renewable resource
- Waste substances must not be discharged to the environment faster than it can assimilate them without impairment of ecosystem function.

3.2.2 Linking Sustainable Development and Integration

Achieving the state 'sustainable development' is difficult because all four principles need to be adhered to; environment, equity, participation and futurity. The complexity of fulfilling all principles embedded in the term, gives rise to multiple challenges. It is not in the scope of this research to describe the sustainability challenge in full. What should be realized is that there is consensus about the challenges of attaining sustainable development when conceptualizing it as three pillars. In order to achieve sustainability, it is necessary to work across fields, sectors and interests (Robinson, 2004). It is also required to focus on multiple scales: spatial and temporal (Dale & Newman 2005; Robinson 2004). Literature on sustainable development often discusses the benefits of creating integration and cohesion. The discussion revolves around sustainable development decisions resulting as an outcome of working collectively rather than as individuals (Pretty, 2003; Healey, 1998), across the three pillars.

Sustainable development thus promotes integrated approaches through the promotion of collective discussions among actors in different domains, which when applied are considered to return favorable outcomes for sustainable development. A basic definition of an integrated approach adopted from Hey (2002) is *early coordination between sectors in order to find synergies, or to set priorities where necessary*. The

definition promotes ccollaborative approaches at an early stage in urban development, while at the same time emphasizing the importance of developing more stakeholder interaction. Interaction should be high in policy development and delivery, observed through widened stakeholder involvement beyond traditional power elites, which recognizes forms of local knowledge and social networks as a resource of institutional power through which new initiatives can be taken legitimately (Healey, 1998). A favorable outcome for sustainable development usually results because a decision has been made with trust in the other parties involved and usually the urge for all parties wanting to benefit from the decision that was made.

It is important to note the widespread agreement that successful implementation of sustainable development, hence integration, requires strategies and solutions to be designed on the spatial scales where the problems have their roots (Polk, 2011, Sedlacek & Gaube 2002). Practitioners of sustainable development such as politicians and academics have recognized that many global problems have their roots in national, regional and local activities (Sedlacek & Gaube, 2002). This means that the implementation of sustainable development should reflect these scales. The local and regional level are seen as the most suitable for translating and implementing sustainable development into concrete actions because they possess characteristics which are beneficial for cooperative strategies (Ibid.). The regional scale however is preferred above the local (Clement, 2005). The relative scale and responsibilities of regions are seen as beneficial for the strategic implementation of sustainable development because of the given proximity to actual problems and the relevant governmental tasks typically assigned to regional administrative levels (Hirschi, 2010). Furthermore, regions are regarded as the intermediary between national and local scales, and sufficient to make connections across wider areas (Ibid.). The role of regions for the implementation of sustainable development is therefore also recognized by the European Union, who in their strategic action plan for soil sustainability, challenge regions to come up with tailor-made solutions.

3.2.3 Integration in Urban Development

The main focus on integration in urban development according to Bekkering et al. (1998) should focus on the efficiency of the functions of the city, the infrastructure systems and their coordination with social, economic and ecological demands. Achieving full integration however is difficult as the many actors involved in developing urban areas have divergent interests when it comes to developing. For example, investors generally look to gain high returns, enterprises want to benefit from the existing infrastructure, urban planners want to integrate the area into the overall urban structure, the local community is concerned about pollution development and aesthetic issues, and regional politicians are keen to know what the impacts on regional development will be (Bekkering et al., 1998). Fulfilling all the demands then becomes a difficult and daunting task where governing processes (actor roles and configurations) determine the outcome of sustainable integrated urban development.

3.2.4 Sustainable soil management in urban development

"How can soil be managed sustainably?"

Sustainable soil is dependent upon soil quality. A precise definition of soil quality is elusive though (Carter, 2002). Ecosystem concepts such as function, processes, indicators and attributes have proved to be a useful framework to describe soil quality. Yet, the multifaceted nature of environmental concerns (scientific, personal and social), contribute to the difficulty of defining exactly what constitutes good soil (Ibid, 2002).

In theory soil quality involves soils in its entirety such as the biological, chemical and physical properties and processes of soils in a region. This definition of soil quality however is open to interpretation and it is therefore important to address specifically what aspects of soil quality are relevant in this particular study. Other studies for example have interpreted soil quality through using a larger scale approach for evaluation, or from a micro perspective relation to the land itself which influences the vision of soil quality.

The first official definition of soil quality stems from the *Soil Science Society of America* in 1997 which reads: "*Soil quality is the capacity of a specific kind of soil to function within natural or managed ecosystem boundaries to: Sustain plant and animal productivity, maintain or enhance water and air quality, support human health and habitation.*

Using the above definition it can be determined that soils in urban areas should not only be able to fulfill a role in supporting trees, shrubs, plants and biodiversity in urban areas but other functions are important too. These functions can be categorized in various distinct sets and has been done so by authors

such as Larson and Pierce (1991), Dailey (1997), Doran & Parkin (1994), Seybold et al. (1997), Karlen et al. (1994) and Harris et al. (1996) (soilquality, 2012):

- Production function or soil fertility: The soil supports the production of biomass for nature and green services by providing nutrients, air, water and a growing medium for roots.
- Resistance function: The soil is able to resist human and physical stress, and has an ability to adapt to changing circumstances.
- Function as a filter and buffer and regulator: The soil maintains the capacity to effectively deal with organic compounds, plant residues and mineralized of organic matter. Furthermore it is able to absorb water and transport it while acting as a buffer against climate change by storing carbon dioxide.
- Source and storage of biological activity and diversity: The soil functions properly as a habitat and storage for large quantities of organisms and micro-organisms.

Some literature is available concerning sustainable soil management. In the scientific journal on 'Biodiversity and Conservation' Niemelä (1999) for example notes that knowledge on soil management should be better integrated into urban planning. To do this the author notes that one needs to know what kind of soil exists, knowledge is needed on the *processes* that affect soil properties, and knowledge on specific *management schemes* to minimize the loss of soil properties needs to be designed (Niemelä, 1999). Pickett et al. (2001) also emphasizes the need to accept the importance of soil by using a more open definition of the urban systems so that multiple functions of soil can be addressed. One of the most recurring themes found in the scientific literature however is the need for scientific information on soil and a database on how the soil interacts with the surrounding environments (Pickett et al., 2008). Several main knowledge components have been identified that would be required in urban soil evaluations (Vršča et al., 2008):

- The diversity of urban land uses and the specifics thereof
- The significance of individual soil functions within different land uses
- Extreme soil variability due to past and recent human activities
- Immaterial and non-consumptive human needs

Represented visually (see figure 3.2-1), sustainable urban planning which aims to manage soils properly must make use of soil quality controls, and apply those controls to various land use changes using as much knowledge as available of soil and its properties.

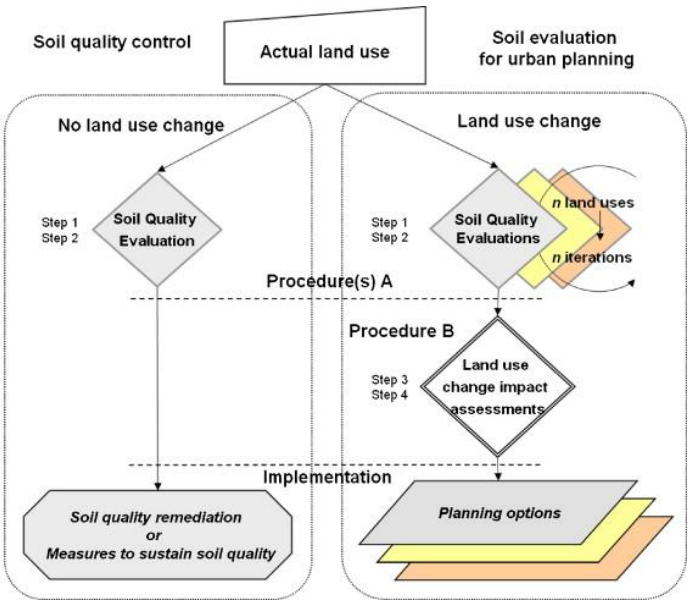


Figure 3.2-1: Soil quality evaluation method (Vršča et al., 2008)

Tools such as soil quality indicators should ideally be available for use to help encourage sustainable soil management in urban policies. In theory these measures and tools help promote (from most sustainable to least sustainable); 1) conservation and preservation, 2) compensation and 3) exploitation. No full distinction is made between conservation and preservation. While conservation allows for soil exploitation it stipulates that

the qualities of soil are not compromised on. Preservation allows for no exploitation to take place, thereby safeguarding the quality of soil. These two are therefore the most sustainable soil management practices as both management practices ensure soils will maintain their qualities. Compensation is a less sustainable management practice in the grand scheme of soil management. Compensation although interpreted slightly differently in different contexts involves the replacement of lost ecological functions and values (Rundcrantz & Skärbäck, 2003). Exploitation of soil is regarded as unsustainable. It does not involve the restoration of ecological values or principles.

Using the framework on sustainable soil management this research will delve into the measures and tools used to ensure that knowledge of soils are diffused to increase urban sustainably. It will identify how integration of various activities takes place to promote soil as an important element during urban redevelopment. It will however not limit itself to looking at the hectares of soil conserved, compensated or exploited.

When connecting the overall debates of sustainable planning, integration and urban development with soil management it is apparent that there are several primary aspects that need to be considered. First of all it is necessary to ensure that a sustainable integrated urban development plan consists of a healthy and pleasant environment for human life. This means that efforts to minimize harmful impacts of human activities on groundwater and neighboring ecosystems should represent the top priorities for urban ecosystem management and, equally, for the management of urban soils as part of the urban ecosystem (Vršča et al., 2008). Second, city planning with as much preservation of soils as possible, through the inclusion of green areas and minimizing the spatial extent of impermeable surfaces etc., should be done as much as possible (Ibid, 2008). Third, urban areas must be planned in such a way that they cause as minimal damage to adjoining areas as possible (Doran and Parkin, 1994; Vršča et al., 2008) or alternatively plans must be made to make more rational use of land in order to maintain as many soil functions as possible. Ideally adequate protective measures must be implemented for soils for all the land in the project area which must be factored into the cost of the project (Vršča et al., 2008). Finally, it is important for sustainable urban planning to avoid urban sprawl and reduce soil sealing (EC, 2002 in Vršča et al., 2008). This means that planning any expansion in city development must take into consideration the selection of 'bad soils' [those of lower environmental quality] for development (Vršča et al., 2008). The idea is that city expansion can be considered less destructive in this way as it promotes the preservation of 'good soils'.

3.3 (Environmental) Policy Integration

"What policy and governance factors enable integration, with soil management"

(Environmental) Policy integration logically follows from the discussion about developing sustainable integrated soil management in urban development. (Environmental) Policy integration involves influencing decision-making processes through creating coherence among policies for different sectors of society (state, market and civil society).

Before continuing with literature on EPI which is useful to understand how soil aspects can be considered in urban development policies, a good starting point is to understand what is meant by policies and respectively policy integration (PI) in general without the environmental adjective. Policies influence directly and/or indirectly the functioning of the economic system, the functioning of the social system, and the functioning of the environment (Briassoulis, 2004). A policy in general is designed to either push actors in their system (economic, social, environment) to change their behaviour by means of punishment, or pull those same actors to behave in a certain way by providing tax incentives among other measures. As such, it is easy to see how each sector of society is affected; state, market and civil society. Policies in theory therefore have to take into account how the functioning of one system affects the other.

An integrated approach in urban development which includes the involvement of relevant social actors and government levels is deemed necessary to address the complexity of societal issues across the economy, environment and the social system in favor of sustainable development (Rossy et al., 2010). As a whole in policy-making, integration differs slightly, and should be understood as a strategy with which to addresses the issue of unexpected effects of policies (externalities/unsustainable development) and address the insufficient problem solving capacity of separate sectors. The aim of policy integration as a strategy is to increase coherence among various policy fields, to reduce overlap, policy gaps and contradictions between them. Four

key elements have been found in practice that enables PI. These are (Meijers & Stead, 2004; Aalbers et. al, 2011):

- Create common goals
- Create common identity
- Ensure feasibility
- Ensure future benefits

The main difficulty with analyzing policy integration is the fact that the theory is synonymous with other theoretical definitions such as coordination and cooperation. Meijers & Stead (2004) however have created a delineation between the other concepts explaining that although coordination and cooperation are part of the process of policy integration, they do not account for the entire process (see figure 3.3-1). As a whole they argue that policy integration requires more interaction, accessibility and compatibility, leads to more interdependence, needs more formal institutional arrangements, involves more resources, requires stakeholders to give up more autonomy and is more comprehensive in terms of time, space and actors.

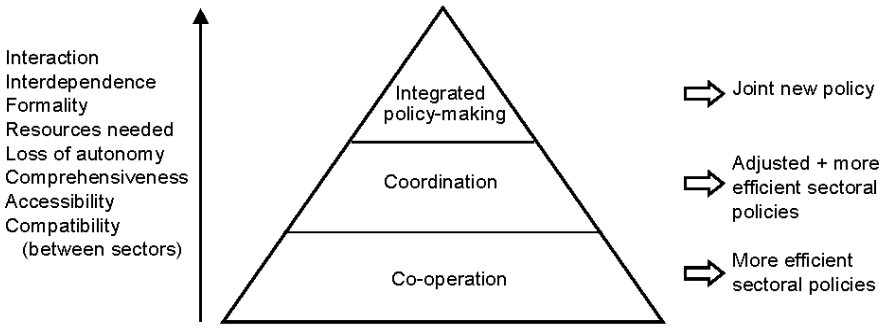


Figure 3.3-1: Integrated policy-making, policy co-ordination and co-operation (Meijers & Stead, 2004)

3.3.1 Environmental Policy Integration (EPI)

EPI is interesting because many institutions worldwide are recognizing the environmental repercussions from development. In order to ensure a lesser environmental burden, EPI as a strategy attempts to bring the environment to the forefront of political decision-making. Where the degree of fragmentation between various sectors (environment, economy, and society) in theory hinders sustainable development, EPI aims to coordinate the sectors in order to promote more sustainable environmental development.

> *"The objective of sustainable development and the integrated nature of the global environment/development challenges pose problems for institutions, national and international, that were established on the basis of narrow preoccupations and compartmentalized concerns.(…)Yet most of the institutions facing those challenges tend to be independent, fragmented, working to relatively narrow mandates with closed decision processes. Those responsible for managing natural resources and protecting the environment are institutionally separated from those responsible for managing the economy. The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must."* (WCED 1987, p.17)

Taking political actions usually involves taking risks, due to unforeseen consequences of new policy implementation. Environmental Policy Integration (EPI) is a policy-making procedure that reduces political risks, and promotes the integration of environmental objectives into non-environmental sectors. EPI requires coordination across actors and in this way it dilutes the risks being taken. EPI has emerged as a key principle for

sustainable development that takes into account the environment to a larger extent (Lenschow 2002a, Lafferty & Hovden 2003). The recognition that sectoral policies, when only pursuing their sectoral specific goals, were unable to solve the increasing complexity and fragmentation of environmental problems prompted the appearance of EPI. It first appeared in the Brundtland report in 1987, as well as Agenda 21. Now other institutions such as the EU recognize EPI as a necessary principle and procedure for sustainable development (Lafferty & Hovden 2003). This is due to the increasing acknowledgment of the cross-sectoral nature of most environmental problems, which are now being advocated with the need to integrate environmental considerations across all sectors of societies (Geerlings & Stead 2003).

In general terms coordination of policy-making is an institutional precondition for consistent and mutually supportive policy measures in and across sectors (Underdal, 1980). Despite the rising support for EPI however, achieving it fully is difficult. This is because from the theoretical standpoint EPI comes with many broad definitions and various study approaches (Persson, 2004). For example, many studies recognize a similarity between the term 'integration' and 'coordination', 'collaboration', 'cooperation', 'consistency' and 'coherence' (Persson, 2004). The result of the similarities with different terms is the development of a number of different conceptual models of EPI. From the practical point of view achieving EPI is also difficult because of the initial prioritization of sectoral-specific goals over environmental ones (Persson, 2004; Geerlings & Sluis-van Meijeren, 2008; Lafferty & Hovden, 2003), which is assumed to be a result of governance features.

Hey, defines EPI as "an early coordination between sector and environmental objectives, in order to find synergies between the two or to set priorities for the environment, where necessary" (Hey, 2002, p.127 in Persson 2004). This definition is adopted in this thesis where EPI is seen as a strategy for policy-making that incorporates environmental goals and considerations at early stages in policy-making, with as a goal to synergize policies in order to minimize environmental impacts. Nilsson & Persson distinguish between three rationales for applying EPI in policy-making. On the one hand the viewpoint is normative suggesting that the environment needs better protection and all sectors of society should help to achieve this (Nilsson & Persson, 2003). Authors, such as Liberatore (1997) recognize a normative rationale for EPI, based on the concern for the integrity of the environment (Nilsson & Persson, 2003). In the normative case a different weighting is attached to environmental objectives in relation to sectoral policy objectives. Liberatore (1997) emphasizes that integration in EPI assumes a form of reciprocity for environmental policy concerns. Laferty & Hovden (2003) similarly recognize a normative rationale for including EPI in sectoral policy, though not simply to remove contradictions and realizing mutual benefits. The authors go further by stating that environmental objectives must be the overarching ones at all stages of policy-making, giving priority to environmental contradictions over sectoral policy contradictions (Nilsson & Persson, 2003). On the other hand EPI has also been advocated from an organizational and procedural perspective that deals with increasing the rationality and effectiveness of policy-making, arguing that when different policy actors are brought together the knowledge pool grows and the chances to identify unknown, win-win or more cost-effective opportunities increases (Nilsson & Persson, 2003). On an organizational and procedural level EPI involves the consideration of positive and negative environmental aspects at an early stage, thereby contributing to greater effectiveness in achieving environmental goals as well as more rational policy decisions in general.

The implications of choosing a normative definition of EPI which specifies a weight for environmental concerns in relation to others is that EPI becomes absolute i.e. it exists in a certain situation or it does not (Persson, 2004). Opting for the organizational and procedural concept of EPI on the other hand avoids having to use an absolute criterion in favor of measuring EPI as a matter of degree (Persson, 2004). While there are arguments against using the organizational rational concept of EPI due to the fact that the observed changes in policy-making are principles for good decision-making in general, the conceptualization allows for a more flexible view of integration (Persson, 2004). Furthermore, literature on integration recognizes that environmental decisions do not always take place at the political level where normative judgments are made, but is also guided by civil servants (Persson, 2004).

3.4 Governing for sustainable integrated soil management

"How can soil be managed sustainably through an integrated approach?"

In order to understand how an integrated approach can be realized and how soil management can best be included in such an approach it is necessary to explain what governance arrangement allows for integration and what characteristics of that arrangement strengthen the outcome towards sustainable soil management in

urban development. This part will therefore describe some governance theory which explains what modes exist, and which ones best reflect the concept of integration.

3.4.1 Governance mode typologies

As was recognized earlier urban redevelopment is currently still plagued by fragmented actors with their own agendas and priorities. The outcome of this is that there is still progress to be made in order to enhance sustainability. Governing is the process with which political decisions are made and implemented and is an important variable in determining integration hence sustainable development. As sustainable development rapidly became an accepted term, it became increasingly evident that different styles of governing can increase the opportunities for sustainable development, or hinder them. The reasoning behind this is that different styles of governing can include perceptions of values and common purpose, such as risks within society while others neglect them. Also, different styles of governing can shift responsibility to different actors, such as those in the market which actually contribute significantly to the sustainability problem due to unaccounted externalities.

Different theories on governance that influence decision-making processes provide some answers as to why actors do or do not collaborate more with each other. The decision-making processes are influenced by power relations, the knowledge of actors, the general knowledge of the environment, the incentives to act and so on. On a more abstract level, the decision-making processes can be said to be influenced by governance modes or typologies in general. This means that the form or organization of actors within a domain impacts what decisions can be made and will be made if they are considered. Different modes of governance have been identified by social scientists. Driessen et al. (2012) and Bulkeley & Kern (2006) have come up with the following list:

- Self-governing
- Governing by provision
- Governing by authority
- Governing through enabling
- Centralized governance
- Decentralized governance
- Public-private governance
- Interactive governance
- Self-governance

Each of these modes of governance has a distinctive form of organization. For the purpose of this research the organization on a regional level is important, in line with the case studies which are focused on a regional project level. Given this, 'self-governance' and 'self-governing' on a regional level does not assume a big role if any at all for the central government. The local government is assumed to have capacities to govern their own activities. A centralized governance mode and 'governing by authority' on a regional scale on the other hand assumes that the central government takes direction as a main actor. Governing by provision focuses on the authority's role as a provider, whereas 'governing through enabling' focuses on authority's role as a facilitator which mostly reflects a public-private governance mode. Decentralized governance and interactive governance emerged in the literature on environmental governance by Driessen et al. (2012) to identify structures when tasks were off loaded from a central government to other local government bodies or where tasks were off loaded in the 'interactive' way to a variety of bodies including private actors. [*see* appendix 1 *for key characteristics of governance modes as identified by Driessen et al., 2012*]

3.4.2 Partnering for Sustainable Development

A partnership, as defined by many professionals in the field of policy and management, is a governance arrangement where different sectors contribute and complement each other for a (shared) vision (Selsky & Parker, 2011). Typically, partnerships strive to reach agreement on one or more specific policies or projects, while at the same time pursuing intermediate goals such as research, education, public outreach, trust-building and so on (Leach et. al, 2002). Overall, partnerships can take several forms. The most common partnership forms can be listed as public-private, private-civil society, public-civil society and tri-sector (Selsky & Parker, 2011). Each of these, while similar in terms of a collaborative approach are structured differently in their mode of conduct. This means that their legal rights and approaches will frequently differ, creating advantages or disadvantages for the partnership setup as a whole.

Partnerships are a relatively new concept. They were first introduced in the scientific literature in the 1980s as collaborative activities in many nations became prominent and extensive (Selsky & Parker, 2011). During this period the government was seen to gradually retract its role in favour of governance, which meant that tasks which were formally the sole responsibility of the government were distributed amongst other actors. A governance approach was seen as a novel way to increase the level of efficiency and effectiveness in policy and policy-making. Stoker (1998, p. 17) describes governance as *"a change in the meaning of government, referring to a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed"*. Indeed this description holds true as governance relies on the interconnectivity of three vital domains which in the past were usually treated as separate entities; the market, civil society and the State (see figure 3.4-1).

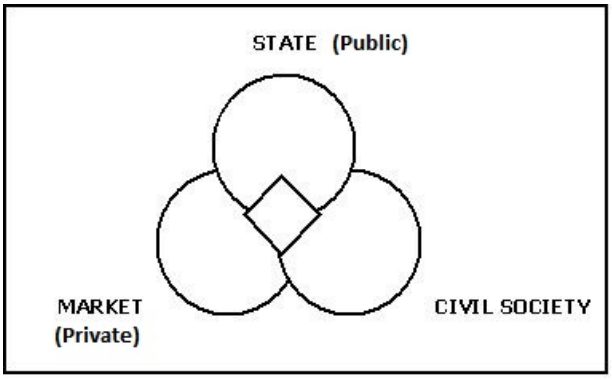


Figure 3.4-1: Interconnection between state, market and civil society

The market, civil society and the State are actors in partnerships that can learn from each other's strengths and try to avoid future issues resulting from their own weaknesses (Stoker, 1998). This creates an environment of greater understanding and trust between actors in each group because they become reliant on each other for the implementation of policies. Jessop (1998) describes this phenomenon as reflexive rationality. Overall different styles of governing as found in a partnership can include various perceptions of values and common purpose. For example, some institutions perceive risks within society while others may neglect them (Stoker, 1998). In addition, a partnership arrangement can shift responsibilities to different actors who can better deal with certain situations (Ibid). For example, there may be market actors who do not necessarily account for externalities and a different actor from the partnership setup can take up the responsibility in dealing with this. The attraction of creating and partaking in a partnership are therefore numerous. Among other things, partnering enables parties to gain access to other competencies such as legitimacy, distinct networks and specialized technical expertise (Esteves & Barclay, 2011).

3.4.3 Environmental Governance

From the brief description above on governance modes and partnerships it is apparent that each mode has a different organizational system. These organizational systems vary in their rules and regulations which can be identified as a main theme for enabling sustainable development. In their research Driessen et al. (2012) have characterized an important shift in urban environmental governance which mostly displays decentralized and interactive characteristics. These two governance arrangements will form the basis for further analysis with a discussion on the possible advantages of such an organizational system to ensure sustainable development as explained below.

Sharing Responsibilities & Diluting Risks

Decentralization and interactive governance does not assume one authoritarian figure, rather a multiplicity of figures. Authoritarian regimes, as Paehlke (1996) points out, fail to include a variety of perceptions and values needed to attain sustainable development. They are less likely to be able to maintain themselves because political elites are not called upon effectively to comply. In fact they overlook the demanding standards of both political rationality and responsibility. From this it is clear that governance is influenced by power relations, which involves an element of political leadership. For sustainable development political leadership cannot be expressed solely by the government as Paelhlke (1996) stated. Instead it requires coordination between actors in order to determine what main (sustainability) issues are at stake, and how best to manage those issues. The inclusion of multiple actors therefore represents two advantages of an integrated approach as it enables the

dilution of risks away from powerful elites and calls into consideration more compliance because of shared responsibilities.

Increased availability of Resources

Decentralized and interactive governance relies on the interconnectivity of actors from three vital domains, the market, civil society and the State which in the past were usually treated as three separate entities. These actors can learn from each other's strengths and try to avoid future issues. This framework is built around the idea that no single agent has the capability to address the multiple facets, interdependencies and scales of environmental problems on their own. Jessop (1998, p.31) supports this by stating that new forms of coordination no longer only involve the public and private divide, rather a set of tangled hierarchies, parallel networks and complex interdependence across tiers of government. From this it is clear that interaction mechanisms are important where knowledge about interdependencies can be shared. Also, it is reiterated that power is an important theme as one actor is not expected to be capable of addressing issues on their own. In fact, by including more actors through more interaction governance builds on the idea of using a greater number of resources through reliance on other actors and their knowledge pools to increase sustainable development.

Increased Interaction

In the literature governance is also said to have emerged in response to shifts in political thinking which emphasized a greater need for ´heterarchy´ rather than conventional hierarchies associated with government. Heterarchy implies a system of self-organization and involves the steering of multiple agencies, institutions and systems which are interdependent yet autonomous (Jessop, 1998, p.29). This differs from hierarchy which often restricts itself to a top-down, often institutional approach, to manage society. Lemos and Agrawal (2006) recognize many problems in hierarchal structures especially prominent when considering environmental and sustainable issues. They argue that hierarchal state-centered regimes actually undermine the success of policies due to a discrepancy in power relations (p.301). Lemos and Agrawal (2006) also argue that the inevitable onset of globalization, which includes common themes of multiplicity, diversity and interdependency, has enhanced the depth of participation and diversity of actors, in effect making an individual hierarchal approach obsolete in current policy-making (p.300). Again the main theme that can be identified is power, and the need to diffuse the power of actors to increase interaction, knowledge and resources in order achieve more sustainable development.

Increased Rational Democratic Decisions

All in all, the rationality of governance is dialogic rather than monologist in an attempt to be democratic so as to promote equality and sustainable development. Paelhlke (1996) argues that democracy, although not great, is the most effective political model because, unlike communism, it promotes trusted political leadership, innovation and social and moral adaptability. Of course it is noteworthy that democratic systems can take different forms. The most noteworthy are deliberative democracy and liberal democracy, the latter being perhaps the most common in current society. Where in the liberal democratic system risks are calculated by strong players and can potentially create grave environmental problems because of irrational decision-making in the process, deliberative democracy provides an opportunity for more dialogue and forms a better basis for rational decision-making (Smith, 2003, p.61). Both these forms of democracy are bound by the element of time which can be listed as yet another theme that influences sustainable development. Liberal democracy requires less time than deliberative systems as dialogue involves more interaction than voting to reach final decisions.

The term sustainable development when conceptualized through the three pillars (economy, environment, society) can be seen as a broad rather subjective term which requires sufficient democratic debate in order to determine a goal and then instill successful policies in society. A greater number of actors are a requirement in the ´sustainable´ debate because it allows for a more intense discussion about the values that should be expressed and incorporated in sustainable development policies. For this reason Smith (2003) and Eckersley (2004) are both strong proponents for deliberative democracy, which involves to a much greater extent the public than the liberal system does. Both authors argue that a lack of public participation endangers sustainable development policy as is the case in the liberal democratic system. The incorporation of public participation in decisions and debates promotes inclusiveness and unconstrained dialogue (Smith, 2003, p.56). These two characteristics – inclusiveness and unconstrained dialogue – are the biggest assets to be gained in deliberative democratic systems over liberal democratic ones.

In summary, the tendency to see states as sole providers of collective goods and ensure sustainable development has become an increasingly inappropriate oversimplification. The state's ability to handle the sustainability problem on its own is undermined by an increasing number of complex environmental problems (Florini, 2000). Governance in general which promotes democracy has generated an inclusive atmosphere between the public and private spheres as more actors are involved in decision-making processes. Democratic principles have led to a restructuring of state functions to respond effectively to the overwhelming effects of terrestrial activities; activities are no longer state-bound and necessitate multiple stakeholders to justify and legitimize actions through various forms of deliberation. Decentralized and interactive governance modes reflect integration the most and offer several key advantages over other governance modes. These are:

- Sharing Responsibilities & Diluting Risks
- Increased availability of Resources
- Increased Interaction
- Increased Rational Democratic Decisions

3.5 Summary

The study of PI and governance has been written about extensively. There is therefore a common recognition that there are three reasons why PI is a useful strategy to enable sustainable development. First PI focuses on bringing together different policy actors, the implication being that the pool of knowledge grows and chances for identifying win-win opportunities increases. Second, integrated policy-making makes it possible to avoid policy contradictions even when no win-win opportunity exists. The third reason is that integrated policy-making serves democratic objectives due to the participation of actors in more informed ways. Goals and targets however could be influenced by the mechanisms of social interaction which in turn could be influenced by actor power bases. These are governance features which are likely to influence the level of (E)PI taking place. Studying these features in practice will yield useful information on the extent to which (E)PI can be successful.

To achieve Integrated Sustainable Soil Management the governance mode has to allow for stakeholders to create common goals, create common identity, ensure feasibility and ensure future benefits. Governance features such as power relations, resources, knowledge networks and so on influence the ability to ensure that the 4 principles of integration can be met.

While Policy Integration focuses on the dialogue between actors from different sectors of society, Environmental Policy Integration emphasizes the environment in the debate. Normative debates are needed to set an agenda for environmental concerns. However, normative considerations for the environment on their own do not provide sufficient basis to ensure that the environment indeed is brought to the forefront. Organizational and procedural aspects are required to ensure a rational approach that enables environmental considerations. Organizational aspects include training and awareness programs about the environment, as well as accountability mechanisms. Procedural aspects include monitoring reports about the environment, and the rules which are in place that set environmental standards.

From the literature a conceptual analytical model can be built (see figure 3.5-1) which is based on all the literature reviewed including governance modes and characteristics of (E)PI, sustainable soil management and urban development. The model presents an array of key themes that according to the literature form part of an integrated sustainable soil management approach.

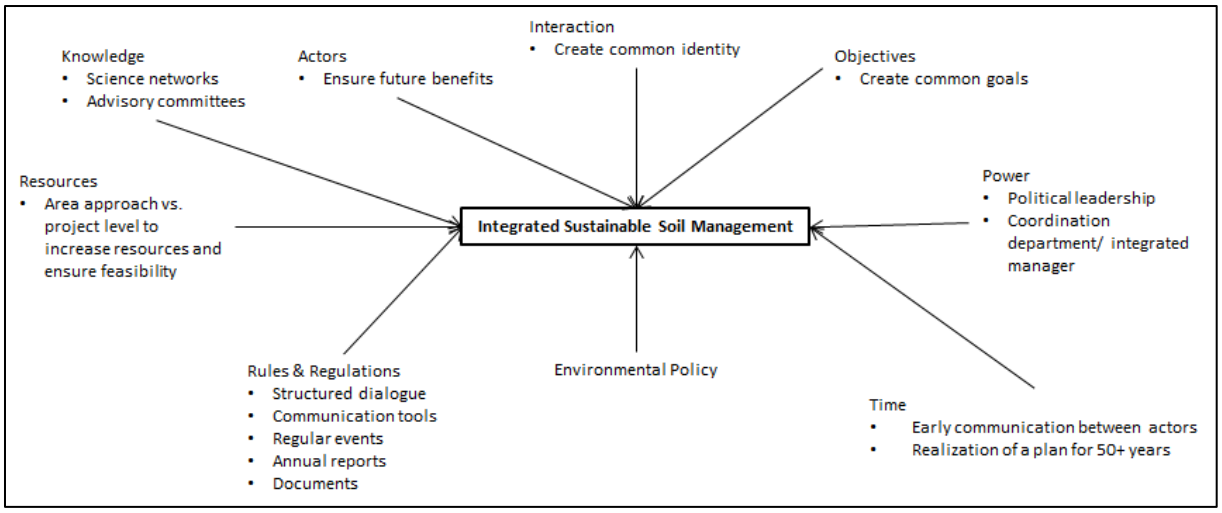


Figure 3.5-1: Conceptual analytical model for integrated sustainable soil management

Chapter 4: Research Design & Strategy

There are two main phases in the research to examine the stimulating factors for integrated urban redevelopment that includes proper soil management; 1) during the characterization of main integrated soil management practices in the literature, 2) during the analysis of the development process and the governance approach used in practice.
This chapter describes in more detail the research approach for the second part of this thesis. The chapter discusses the setup of the practical analysis, explaining the choices for the chosen case studies and the research strategy used. Included in the research strategy is the operationalization of key variables used to assess the case studies. The case studies are a relevant part of this study and will help to minimize the knowledge gap on the lack of (E)PI evaluative and explanatory studies.

The case studies are used to obtain empirical and/or analytical values in relation to the level of (E)PI as derived from the literature and workshop. As well as that, the case studies are used to identify, through the use of a historical analysis and multi-level governance assessment, what factors have contributed to reaching the current level of (E)PI. Finally the case studies are compared and contrasted which will help to explain what features promote the level of policy integration that is more inclusive of sustainable soil management.

The chosen cases will include minimal variation in terms of 'type of urban (re)development', but vary in terms of project scope and project funding. Among other features, by contrasting the cases with each other, this investigation will assess whether these variables affect the outcome of a sustainable integrated approach that includes a high level of soil management.

4.1 Introduction

A description of the research design and strategy is necessary in order to prevent confusion and minimize the level of subjectivity in a predominantly analytical research, such as this. This chapter explains in detail the steps that are taken during this research. Rather than developing a theory, this research will contribute to an existing knowledge gap regarding factors affecting the implementation of an integrated sustainable development approach which takes into account to a larger extent soil management issues in cities.

This research consists of two main components in order to answer the question on what factors determine an effective level of integration, namely a literature review and a case study research. The literature review is necessary to understand how integration works in relation to sustainable development, what is meant by (E)PI and how environmental soil considerations are accounted for using these concepts. The use of a literature review has contributed to the development of a framework with which to systematically analyze and assess the case studies.

The case study method is used to see if the procedural, organizational and substantive strategies found in the literature to implement sustainable integrated soil management work in practice, and determine what key elements enhance the position of integration and the level of sustainable soil management in urban development.

The research as a whole involves a workshop [see appendix 5] as well as an assessment of journal articles, policy documents, databases and monitoring reports related urban planning. The main sources for obtaining the necessary data include electronic university databases containing scientific articles, such as Scopus and Omega. In addition open-access databases such as regional government documents and the European Environment Commission [EEC] are accessed.

The case studies in this research are a practical element of this research and will be used to examine in depth how many criteria from the literature are taken into consideration and/or implemented in different projects. Throughout the case studies governance modes and characteristics will be described and the influences it has on the process and final output. The knowledge found will be important for other cities seeking to successfully incorporate a full scale of integrated sustainable development strategies that realize the importance of proper environmental- and soil management at a higher level.

4.2 Case Study Selection

In total four cases have been selected for this research. The most important criteria for the case studies is that they consist of redevelopment projects that aim to improve soil sustainability. As CityChlor aims to improve sustainability through improving soil management the chosen projects will require actors to have ties as a partner to CityChlor.

By limiting the scope of this research to four cases, the idea is to produce in-depth rather than in-breath result, especially important when covering the broad terminology of 'integrated' sustainable development strategies.

The four cases are all train station developments in inner city areas and are all in the realization phase of project development, thereby minimalizing thematic and temporal variation. Governance however, which is the independent variable, varies because the cases were chosen from different European countries. The chosen cases come from Germany (Stuttgart [S-21]), The Netherlands (Utrecht [Central Station]), Belgium (Gent [Sint-Pieters]) and France (Lyon [Lyon-Confluence]). The table below provides some information on important details of the case studies.

	Utrecht Central Station Project (CU2030)	Stuttgart (S21)	Gent-Sint-Pieters	Lyon (Lyon-Confluence)
Total (expected) Investment costs	3.2 billion euros	4.1 billion euros	496 million euros. 5% paid by the municipality of Gent	1.8 billion euros
Start year construction	2010	(1994), 2010	2006	2003
Urban redevelopment area	90 ha	100 ha	8 ha	150 ha
Population	316,448	600,068	247,486	467,000 (approx.)
Partners	• Gemeente Utrecht • Corio • ProRail • NS • Jaarbeurs Utrecht	• European Union • The federal government (BUND) • The state of Baden-Württemberg • German Railway (Deutsche Bahn AG) • The city of Stuttgart • The Stuttgart Region	• Stad Gent • Eurostation • NMBS-holding • De Lijn • Infrabel • Agentschap Wegen en Verkeer	• WWF • Greater Lyon • SPLA (local public redevelopment company) • (Nedo, since 2011)

Table 1: Case study selection and characteristics

One reason for choosing these urban development projects is because they are located in CityChlor - project commissioner - partner regions. Second, the case studies as previously mentioned, vary in governance arrangements and size which is a requirement to investigate how these variables affect sustainable integrated soil management processes. A comparison between large and small cases can provide more information on the dynamics of governance arrangements and discern how these affect the level of policy and integration efforts that takes account of environmental (soil) considerations.

The first case study will be conducted in Utrecht. Gent, Stuttgart and Lyon-Confluence are the case studies that will follow .Utrecht will be used as a pilot case study where interesting facts that have been overlooked can be more easily adopted and adapted for the following case studies. In terms of governance, the partners directly involved in the Utrecht project comprise of a mix of public and private actors varying from the local to the national scale.

Gent is the second case study in this report and is by far the smallest, both in terms of scale and budget. In terms of governance the partners directly involved in the project comprise of mix of actors at the public scale, representing the local and national scale.

Stuttgart is the third case study in this report and is the second largest in terms of project scale which covers roughly 100 ha of land. It is interesting that the investment in this project are the highest as well as total population. The Stuttgart project will therefore be particularly interesting to test how budget, land area and population size influence the level of policy integration with a high level of environmental considerations in comparison to the other projects. Overall though this research will attempt to remain focused on the scale and governance aspects that affect integrated sustainable soil management. The direct partners involved in this project include multiple layers of public actors ranging from the local realm to the national and even international realm.

Lyon is the fourth and last case study in this report. It is the largest in scale, covering approximately 150 ha of ground. Its governance arrangement in terms of direct partners is comprised of public and private actors ranging from local to international.

4.2.1 Stakeholder selection:

Apart from case study selection criteria another important design aspect of the case studies involves selecting relevant stakeholders to interview about environmental (soil) integration and governance processes. Literature on governance recognizes that the efficacy of state-, market-, or civil society-based strategies depend on support from each other's social interactions (Lemos and Agrawal, 2006, p. 298). Adequate policy research therefore involves actors from all these domains. In any governance research therefore, stakeholder selection has far-reaching consequences for the generation of results about the interests, behaviour, policy agendas and influence on decision-making processes of the relevant actors (Brugha and Varvasovsky, 2000, p. 239). Stakeholder research plays an important role in the assessment of (E)PI within urban (re)development, as it is used to understand how stakeholders cooperate effectively with one another, to understand the policy context, and to assess the determining factors for implementing (E)PI. Stakeholder research thus plays an important role in obtaining insights on the attitudes, interests and capacities of stakeholders on the available options to implement (E)PI processes as discussed in the literature.

Interviews are important in this research as they serve to enhance the understanding of actor characteristics. The interviews are conducted on a number of respondents from the public, private and NGO domain, either face-to-face, or via phone and e-mail. Actors related to the public sphere are the licensing authorities (municipalities). Actors related to the private sphere are designers, construction engineers and contractors. The civil NGO sphere covers independent actors and knowledge brokers.

Public actors are defined as those that are deemed important in creating the policy context that give rise to institutional arrangements that structure and direct actors' behaviour in an issue-specific area (Falkner, 2003, p. 72-73). Hence, public actors are expected to take responsibility for natural resource management. They seek to influence the implementation of policy options by creating rules and regulations, which discourage or stimulate certain behaviour patterns of non-state actors.

Actors that operate in the private (market) domain all have their own perspectives on natural resource management problems. Each actor uses the same resources for different reasons, and values this use in different ways. In addressing integration to improve resource sustainability, it is therefore crucial to understand these different perspectives and valuations.

Finally, NGO actors are those that represent civil society. They are empowered by their ability to influence public authorities and the policy agendas of private firms without having to rely on established channels of decision-making (Wapner, 1997, p. 66).

The actors to be interviewed are partners in the urban redevelopment projects. They were chosen from the official project websites and include a mix of actors. The aim is to interview actors from different spheres in order to determine an unbiased view of integrated sustainable soil management.

4.3 Operationalization

It is apparent that the key elements identified in the conceptual model are largely interrelated and are therefore difficult to examine individually. Furthermore, they all represent features found in the governance framework designed by Driessen et al. (2012). For example, Actors whom need to be ascertained that soil management will lead to future benefits, and Interaction which stipulates the need to create a common identity about proper soil management can be grouped in one category 'actor features'. This group will examine the position of actors by looking at the type of actor involved in the project and the configuration of actors to create an identity. As such an attempt is made to group all the key elements as depicted in the model into a governance framework such that these can be operationalized.

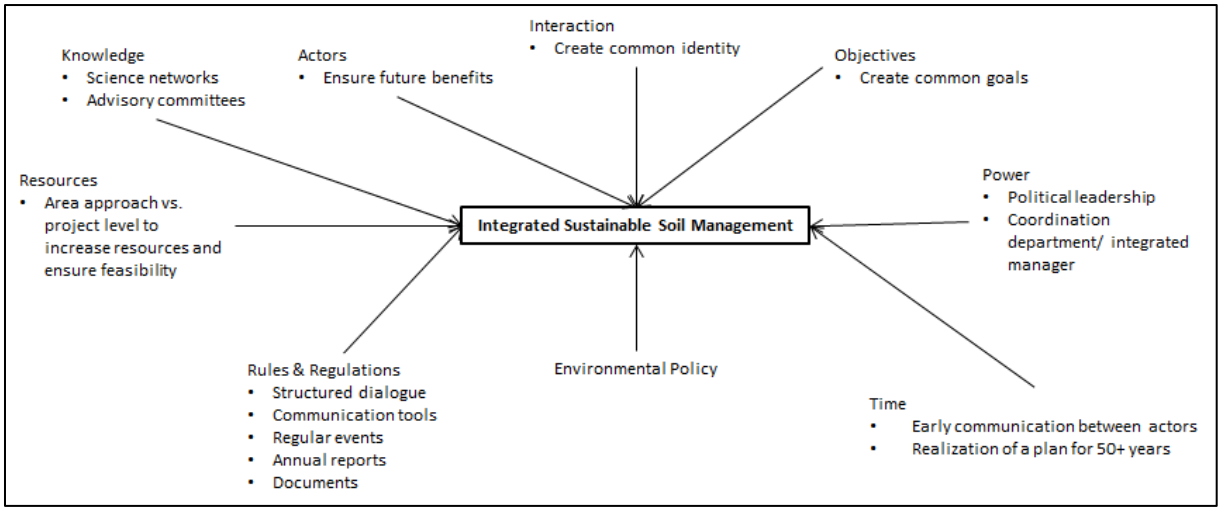


Figure 4.3-1: Conceptual analytical model for integrated sustainable soil management

4.3.1 The governance framework

Literature on governance covers three clusters of features that are relevant to obtain an understanding of the factors that determine the level of (soil) integration taking place in the practical field of urban (re)development. These are:

1) Actor features; initiating actors, stakeholder position, power base
2) Institutional features; model of representation, rules of interaction, mechanisms of social interaction
3) Policy content features; goals and targets, instruments, science-policy interface

A conceptual framework that recognizes these distinct clusters can lead to detailed explanations on the main principles that have led to the level of integration observed in urban (re)development projects. Also the clusters can help provide explanations on the implementation of normative, organizational and procedural processes that help to explain the level of sustainable integrated soil management.

Actor features

Actor features are considered a normative element. This involves identifying the key actors that initiate action and define environmental interests to address the issue of sustainable urban (re)development. The stakeholder position involves determining the relative distance between actors in the stakeholder arena based on their interest, capacities and interaction with other stakeholders. The power base is a measure to specify the resources of actors, and their ability to mobilize those resources.

- Initiating actors: The reason why an actor initiates, or is involved in sustainable soil management is of primary interest to this research. The initiating potential of an actor can be identified by its adoption of strategic options that enable sustainable soil management. Initiating actors can be characterized by their sustainability considerations, long term vision, active participation in experiments and pilot studies, and so on.

- Stakeholder position: An actor's position relative to other actors in the field determines to what extent it can influence the implementation of measures that enable integrated sustainable soil management. Bryson (2004) presents a useful way of identifying the position of stakeholders by focusing on four aspects: interest, power, resources and regular contact with other actors. Bryson's model provides a tool to illustrate which actors are important in taking the lead in addressing integrated sustainable soil management and which actors must be targeted to address this problem. Based on this model, conclusions can be drawn about which stakeholder networks can be formed to create the circumstances under which integrated sustainable soil management is most likely to occur. The four aspects represent the features that are studied in order to determine the stakeholder position of actors pertaining to the government, market parties and scientific community.

After assessing the four aspects of stakeholder position, each actor can be positioned as ''key players, ''context setters'', ''subjects'' and ''crowd'' in the power-versus-interest grid in figure 4.3-2 (Eden and Ackermann, 1998; De Lopez, 2001). This categorisation is useful in specifying how actors may be involved, who must be actively engaged due to their high interests in and power over a certain phenomenon. Context setters are characterised by their significant influence over, but little interest in solving an issue. These actors must be closely monitored and controlled, because they may pose a risk to the implementation process. Subjects have a high interest but are little influential, and are thus lacking the capacity to impact the implementation process. However, they are, almost by definition, supportive and can gain influence by forming coalitions with other actors. These actors are often marginal, which must be empowered in order to increase long term viability of the implementation process. The crowd are actors with little interest and influence over the process and outcomes of integrated sustainable management of soil in urban development. Moreover, there is little need to involve them in the process.

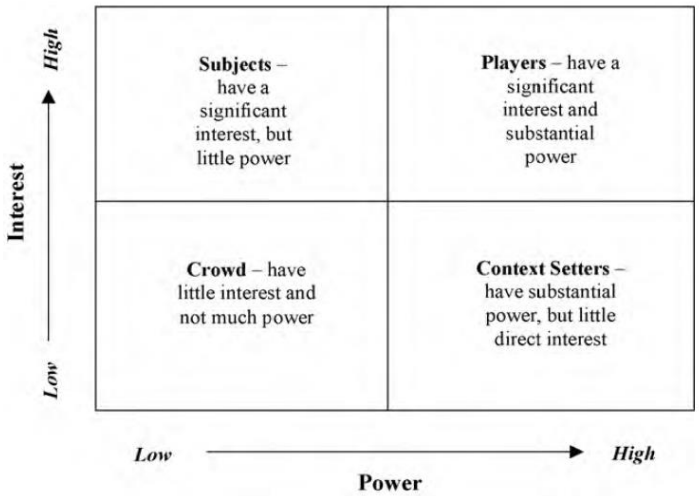


Figure 4.3-2: Roles of actors in terms of power and interest (adopted from Bryson, 2004, p.30)

Institutional features

Institutional features are considered an organizational element. The study of institutional features provides an understanding of the relationships between actors from the different domains. Among these features is the model of representation, which describes how environmental governance is represented and by whom. Rules of interaction refer to the formal and informal rules created by actors to organize procedures, participation and implementation. In summary, institutional features consider the processes by which structures, which includes schemes, rules, norms, and routines, become established as authoritative guidelines for social behaviour" (Scott, 2004. p. 408). Mechanisms of social interaction specify how these formal and informal rules are shaped and implemented; this can be either top-down, negotiated between public and private actors or exclusively by actors operating in the private domain or civil society.

Policy content features

Policy content features are considered as procedural elements. The focus of this cluster is on the involvement of public authorities through the setting of goals and targets, implementation of policy instruments, and the science-policy interface. The policy perspective is used to assess the contribution of sustainability strategies. The role of the state is to establish and maintain regulations which create an appropriate environment for sustainable development to occur (Lundvall, 1992, p. 24).

4.3.2 Grouping key factors

Group	Key factors
Actor features	Actors, Interaction
Institutional features	Objectives, Power, Rules and Regulations
Policy Content features	Time, Knowledge, Resources, Environmental Policy

Table 2: Grouping key factors

4.3.3 Operationalizing Actor features of 'Integrated Soil management'

When analyzing actor features present in integration the object of integration should be specified (i.e. what has to be integrated?). Briassoulis (2005) describes several policy objects which can be measured. These include relationships among policy actors, relationships among policy objects, relationships among policy goals, relationships among policy structures and procedures, and lastly relationships among policy instruments. Generically, the more relationships in each of the policy objects the higher the level of integration experienced. For the purposes of this assessment the object of integration is the relationship among policy actors from different sectors of society to stimulate soil management through the development of common goals. The conceptualization of PI in the previous chapter was linked to SD which theorizes that the more relationships among actors from different fields, the greater the chances are at attaining SD.

Given that the aim of policy integration is to *increase coherence among various policy fields*, to reduce overlap, policy gaps and contradictions between them, the measurement of success in its most basic form would involve assessing communication, commitment and cooperation patterns among involved actors, as these affect coherence. PI among policies can be expected if the relationships among actors are cooperative, collaborative, non-conflicting, and non-adversarial in general, and if actors have shared values, common visions, common goals and abide by the same rules even when these are not within their organizational mandate (Shannon, 2002 in Briassoulis, 2005). Communication amongst and between actors provides a chance for mutual agreements to be made, and as governance literature suggests, it also allows for more debate and a greater chance at achieving a 'win-win' situation that favors sustainable development. Commitment is necessary by all stakeholders involved because a lack of it could hint at contradictions. Similarly a lack of cooperation amongst actors could also hint at contradictions felt between actors and stakeholders, and thus a lower level of policy integration. Indeed, the four principles of PI indicated earlier [Create common goals, Create common identity, Ensure feasibility and Ensure future benefits] require a high commitment, sufficient communication and cooperation in order to succeed.

4.3.3.1 Variables

For the case studies, policy documents will be read and translated when necessary. In addition, whenever possible project partners, which includes actors from the public and private sphere, will be asked to assess the communication, cooperation, and commitment they are experiencing amongst each other during their redevelopment project. To best determine a level of integration a numerical value will be used to denote where possible to what extent those main criteria are experienced. In addition to those three main criteria a measurement of leadership will be asked for, as well as the urgency to finish the project and the encouragement to be involved in the project.

See Appendix 2 for the question set used to assess the actor features of integration

Group	Key factors	Variables
Actor features	Actors, Interaction	Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof

Table 3: Integration actor feature variables

4.3.4 Operationalizing Institutional features of 'Integrated Soil management'

In 2008 the Urban Soil Management Strategy (Urban SMS) was launched (Urban SMS, 2011). This project includes eleven partners from seven central European countries, who aim to define, design and develop soil management strategies (Urban SMS, 2011). The project has identified the most prominent problems resulting from a lack of urban soil management (see figure 4.3-3 below). An understanding of the most common problems is necessary so that these can be specifically targeted and addressed through institutions.

Problems resulting from the lack of urban soil management

- Uncontrolled soil consumption by construction of buildings and development of city infrastructure
- Uncontrolled soil sealing related to soil consumption
- Soil and water contamination (heavy metals, organic pollutants, all other xenobiotics, pathogens)
- Source for air contamination by particulate matter
- Loss of biodiversity, vegetation perishing
- Micro- and meso- climate deterioration

Figure 4.3-3: Problems resulting from the lack of urban soil management (Urban SMS, 2011)

From the list of problems resulting from the lack of urban soil management provided by the EU it is clear that problems arise due to a mixture of urban processes, and outputs of urban processes. Urban processes include building and constructing city infrastructure while the outputs of those urban processes include biodiversity loss and soil sealing. In order to ensure that soil aspects are included in an integrated approach one is therefore required to take into account the use of particular soil management processes and outputs in urban redevelopment.

4.3.4.1 Variables

To assess the use of measures to integrate soil issues in the case studies, policy documents will be read and translated when necessary. In addition, whenever possible project partners, which includes actors from the public and private sphere, will be asked to assess the extent to which the measures and tools defined apply to them.

Institutional measures and tools which influence the integration of soil issues can be categorized in terms of Normative, Organizational and Procedural aspects. Measures and tools should not be seen as static in their category as they are often linked with each other. For example, if there is a high level of political will to make a change to current soil conditions, trends can be seen in organizational and procedural aspects to line up with the will for change. In an organizational sense a high level political will can translate to the development of accountability mechanisms for soil use. In a procedural sense political will can translate to increased monitoring of impacts on soils.

See Appendix 3 for question set used to assess the use of institutional measures to integrate soil issues

Group	Key factors	Variables
Institutional features	Objectives, Power, Rules and Regulations	Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools

Table 4: Integration Institutional feature variables

4.3.5 Operationalizing Policy Content features of 'Integrated Soil management'

The operationalization of policy content features is based on the framework developed for (E)PI. This framework emphasizes the importance of inputs and outputs generating a more accurate overall picture of the project and its influences. Because soil is inherently part of the environment the EPI framework can be used a basis for further development specifying soil as a component. Some authors define EPI as a process, others stress the output of the process 'an integrated policy', while others emphasize the importance of both process and output. Collier (1994) for example focuses on the process of EPI and defines it as aiming at a) achieving sustainable development and preventing environmental damage, b) removing contradiction between and within policies, and c) realizing mutual benefits and the goal of making policies mutually supportive. Similarly the Organization for Economic Cooperation and Development [OECD] also focuses more on the process side of EPI, defining it as "early coordination between sector and environmental objectives, in order to find synergy between the two or to set priorities for the environment, where necessary" (Briassoulis, 2004, p.10). Persson (2004, p.23) suggests that both process and output are important, and that an understanding of the linkage between process and output adds value to an EPI study and as such this study will also attempt to include both process measures and output criteria.

4.3.5.1 Variables

To assess the policy content in the case studies, policy documents will be read and translated when necessary. In addition, whenever possible project partners, which includes actors from the public and private sphere, will be asked to assess some key variables.

Process

The focus of finding the policy content related to integrated soil management in the individual case studies will be on based on analytical procedural tools. Analytical procedural tools for the assessment of sustainable integrated soil management include investigating the use of environmental cost/benefit analysis, impact assessment, strategic planning, the use of eco-efficiency targets and indicators and the use of measures to monitor soil management across different actors.

Output

Studying policy output requires more subject-specific variables and knowledge about environment-sector linkages and thus a set of substantive criteria are needed for an assessment (Persson, 2004). However, including both process and output criteria should in theory lead to answers both on how integration can be achieved and if the resulting outputs are sufficient in relation to the environmental problems resulting in a better overall evaluation on the level of sustainable soil management.

Substantive output criteria for measuring soil integration include the internalizing of external costs, the generation of behavioral change, and the withdrawal of damaging soil subsidies.

See Appendix 4 for the question set used to evaluate policy content features of sustainable integrated soil management.

Group	Key factors	Variables
Policy Content features	Time, Knowledge, Resources, Environmental Policy	Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities

Table 5: Integration Policy-Content feature variables

4.4 Summary

The first part of this chapter introduced the case studies and explained the choice for them. The case studies are an essential part of this study as they aim to contribute more knowledge to existing literature. The second part of this study re-visited the conceptual model and grouped together the key elements of the literature and case studies into a governance framework.

An investigation of governance features (actor-, institutional-, policy content-features) observed in each case study will be necessary to determine the main drivers that are responsible for integrated development and sustainable soil management. The data collected pertaining to actor features, institutional features and policy content features in each case study will be contrasted in chapter 9. This will allow to further explain important features of integrated development with soil management, and help to answer the last question in this research on the opportunities and barriers for applying an integrated approach. It is important to note that the governance framework is primarily intended to measure transitions from one type of environmental governance to another. Therefore it will also be essential to identify the main drivers that are responsible for these transitions in order to explain the success factors that should be applied in an integrated approach.

Group	Key factors	Variables
Actor features	Actors, Interaction	Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof
Institutional features	Objectives, Power, Rules and Regulations	Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools
Policy Content features	Time, Knowledge, Resources, Environmental Policy	Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees

		Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities

Table 6: Integration Actor, Institutional and Policy-Content features

Chapter 5: Case Study - Utrecht Central Station redevelopment

Important questions answered in the case studies are the following:

- **What ambition do governments have for soil management at the local /regional level**
- **What measures and instruments can be identified with regards to sustainable soil management**
- **How are governments at the local/regional level striving for integration**
- **What results were achieved**
- **How was the process organized and executed**
- **What is the applied mode of governance**

5.1 Project Background Information

The Utrecht Centre Project (CU2030) concerns the restructuring of the area around Utrecht central train station including the Hoog Catharijne shopping centre in which the station is situated. It involves the construction of 330,000 square meters of new offices, 1,750 apartments and 61,200 square meters of shops, in addition to some infrastructural developments intended to open up the centre. In total 5 partners are involved with the plan; Gemeente Utrecht, Corio, ProRail, NS and Jaarbeurs Utrecht.

The inner city area of Utrecht has been plagued by pollution caused by industries in the past. These industries left behind pollutants when they relocated or ceased to exist in the central area. Prior to the project CU2030 it was determined by soil experts that there was a significant amount of pollution (Gemeente Utrecht, 2006, p.11) in the form of pollution plumes in some of the planned project locations. These, by law, required remediation in order to allow risk-free living for inhabitants. If not remediated various consequences would result. Further degradation of soils through the spreading of pollution plumes for example would result in the loss of value of the land, due to the environmental disadvantages caused by pollution. These disadvantages would come in the form of a snowball effect causing further social and economic problems.

Since the 1980s the government of Utrecht had already started making plans to redevelop the central station area, yet all attempts to start redevelopment had failed until recently. The problem of pollution in the soil is one of the reasons why redevelopment of the inner city area stagnated. Large parties in the area did not recognize the benefit of redeveloping in the central station area and bearing risks of being situated on polluted soils, or being threatened by pollution plumes.

In 2002 a plan for the Utrecht inner city redevelopment was eventually initiated and agreed upon. The plan, unlike previous ones, is seen to be an integrated one which aims to improve the sustainability of the inner city. Important details of the plan (masterplan stationsgebied Utrecht) are summarized in the table.

CU2030	
Total (expected) Investment costs	3.2 billion
Start year initiation of project	2002
Start year construction	2010
Estimated completion	2030
Urban redevelopment	90 ha
Population of metropolitan Utrecht	316,448 (approx.)
Partners	Gemeente Utrecht Corio ProRail NS Jaarbeurs Utrecht

Table 7: CU2030 details

5.1.1 Actor description

The plan that was initiated in 2002 includes 5 main partners:

- ProRail is a semi-private organization in the Netherlands, responsible for building and maintaining rail infrastructure. The organization includes three branches; NS Railinfrabeheer, Railned and NS Verkeersleiding.
- Corio is a private organization within the CU2030 project area. The organization specializes in property development, and owns a large retail shopping center in Utrecht.
- NS is the national railway service in the Netherlands and is a public agency. Its main responsibilities include transporting passengers and ensuring that the trains are maintained. Another task they have involves developing transport nodes.
- Jaarbeurs Utrecht is a private organization, offering space for conferences, expositions and large events. Their interest lies in ensuring that people have positive experiences in Utrecht through the provision of their services.
- The Gemeente Utrecht is the government of Utrecht. It is a public organization whose overall task involves ensuring the wellbeing of the citizens of Utrecht as well as the wellbeing of all visitors to Utrecht.

The main partners identified comprise of a mix of public and private actors. The development of a public-private partnership according to the literature brings with it advantages; Sharing Responsibilities & Diluting Risks, Increased availability of Resources, Increased Interaction, Increased Rational Democratic Decisions. A description of the historical development and project development will follow in the analysis, providing insights into the actual advantages in comparison to the perceived ones.

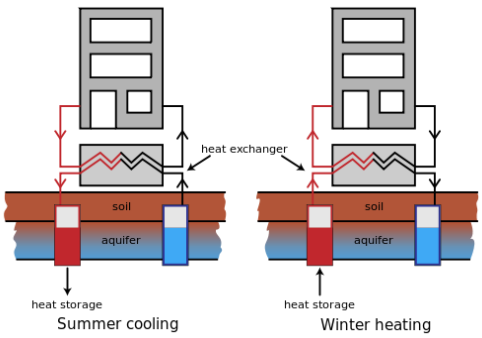
5.2 Project Innovations

Several partners are involved in the CU2030 project. These are the Utrecht government, Corio, ProRail, NS and de Jaarbeurs. The involvement of these partners offers several advantages; 1) A larger redevelopment area can be considered, 2) More resources are available (monetary and knowledge), 3) More debate is possible (on better soil management), 4) Risks for soil use is diluted across actors. These advantages have led to an innovative approach on soil management, namely the 'Biowasmachine'. The CU2030 project has implemented the 'Biowasmachine' to remediate soils over a large area.

Figure 5.2-1: The Biowasmachine (obtained from Gemeente Utrecht)

The Biowasmachine is an innovative remediation technique which has been implemented in the Utrecht Central Station area. The technique which was implemented in 2010 at the start of project construction makes use of a biologically friendly chemical reaction to break down pollutants in the soil and groundwater. This technique remediates a large area of 700 ha. The main focus of this particular remediation technique is on removing volatile organic chlorides from the soil. Because the break-down process of those volatile chloride compounds using biological bacteria is slow a solution had to be found to speed up the process to ensure that exposure to polluted soils after project completion cannot occur. The solution to overcome this problem was through implementing
a sustainable heat and cold storage system. The advantage of implementing a heat and cold storage system in the Utrecht station project area is that the bacteria are moved around allowing them to grow and work to break down the volatile chlorinated pollutants rather than breaking down themselves which would cause other significant risks to humans. Another advantage of the heat and cold storage system which was needed to move the bacteria around is that it is considered a sustainable source of renewable energy. Such a system collects heat during the summer and stores it in the ground to be used again in the winter. In the winter the system collects the cold energy storing it in the ground to cool down buildings in the summer.

A drawback of the biowasmachine is that the system does not prevent unpolluted 'good' soils from being affected. The biowasmachine consistently moves around water and bacteria in the entire project area, mixing them together with 'good' soils. In a way the technique dilutes volatile chlorinated compounds over a large area, thereby minimizing pollution of those compounds to acceptable levels but polluting other soils.



5.3 Analysis

5.3.1 Historical Project Development

Plans for redevelopment started already in the early 1980s. The municipality wanted to *"achieve a harmonious interaction of functions through mutual planning"* (Klijn & Teisman, 2002). A Memorandum of understanding was published in 1988 to commemorate the memorandum and stimulate mutual planning which led to the national government, the Dutch national railways (NS), the Jaarbeurs, and the owner of the Hoog Catharijne shopping centre drawing up plans to redevelop the area. In 1993 the master plan was realized, which included several differences of opinion by the main stakeholders. The differences of opinion between the stakeholders led to an initiative for the creation of a development corporation owned by the municipality and three large project developers. However, interest in developing the area remained low, and the initiatives put forward by the development corporation were subsequently blocked by the NS, Jaarbeurs and the owner of Hoog Catharijne.

In 1996 a new attempt was made by the municipality of Utrecht to engage in a cooperative venture with the main stakeholders. In 1997 the cooperative venture was presented in a 'Definitive City Plan Design' (DCPD). The plan was organized by a political party called Leefbaar Utrecht, and called for the stakeholders to further elaborate the plans for their respective organizations. This led to mutual agreements about investments into the 'Public Space', under the condition that the national government would contribute. In the spring of 2000, cooperation between the municipality and the private parties failed once more. The private parties (i.e. the *Jaarbeurs* and *Winkelbeheer Nederland*) withdrew because they felt that the investments they had to make in the public space were too high.

After winning a political election in Utrecht, the Leefbaar Utrecht party started to amend the plans proposed in 1997, and in 2002 consulted the citizens with two new versions of the plan. In 2002 the version which incorporated certain 'green' qualities (more trees, restoration of canals) was accepted (CU2030; Klijn & Teisman, 2002, p.3).

5.3.2 Actor features

- The gemeente Utrecht is seen as a 'player', with the highest interest in realizing clean soils, and a reasonable amount of power to achieve the goal of cleaner soils.
- Corio was identified as a 'context setter', displaying much power due to its international market status, while its interest in clean soils and the necessary heat and cold system is less because it requires technical adaptation for its building.
- ProRail is identified as a 'subject', having little power to influence the overall decision-making process, but displaying high interest in clean soils and the infrastructure to realize the clean soils.

- The assumption is made that the NS is labelled as a 'crowd', displaying little power to make a difference in the decision-making process, and less interest in realizing the same ambitions as the gemeente Utrecht.
- The Jaarbeurs Utrecht, similar to Corio, is assumed to be a 'context setter'. Its market value is high resulting in a considerable amount of power, but its ambitions are different from the gemeente of Utrecht due to the focus of the organization on delivering services to people.

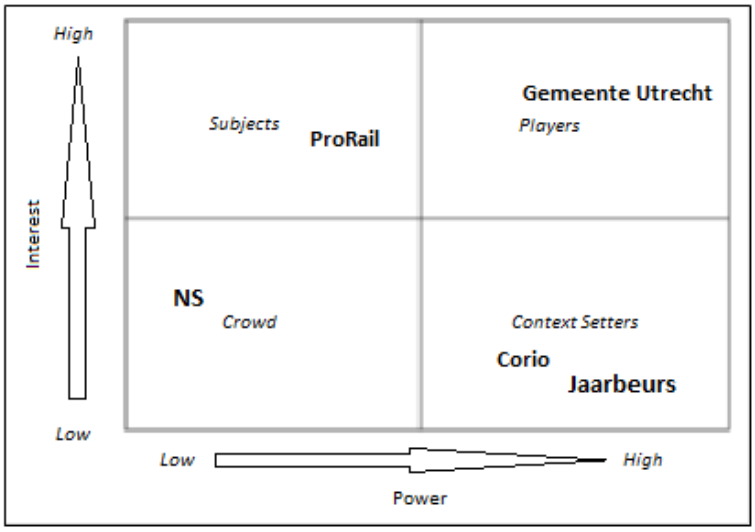


Figure 5.3-1: Power-Interest grid CU2030

5.3.2.1 Summary

The main actors in the CU2030 partnership have been depicted in a power-interest grid. Their position has been based on information gathered during interviews and key mission statements found on their respective websites as well as the brief history of the project development. By depicting the partners on such a grid it is possible to hypothesize about the likelihood of the project development to take a certain route towards various goals. Given that the Gemeente Utrecht is a 'player' in this project it is likely to see the project evolve taking large considerations for its' goals and ambitions over the other partners. All in all the description of actors and their interactions will offer an interesting comparison to the other case studies on important features deemed necessary to improve soil conditions.

Variables	Description
Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof	Actors: • A mix of public and private actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate intensively. Interaction: • The Gemeente Utrecht is the main partner in charge to create an identity about soil and communicate the importance of them.

Table 8: CU2030 Actor Integration features

5.3.3 Institutional features:

5.3.3.1 Contextual Environmental Policy Background:

Dutch environmental policy is mostly formulated at the national level. Regional and local authorities are then placed in charge of implementing the policy in their jurisdictions. The regional and local authorities in charge of environmental policy are comprised of provinces, municipalities, and water boards. There are twelve provinces in the Netherlands. The Environmental Management Act (EMA), which was passed in 1993, was a significant step towards integration of existing environmental laws. The EMA replaced numerous pieces of legislation, including the Waste Substances Act, the Environmental Protection Act, and certain provisions of the Air Pollution Act. The purpose of the EMA was to establish uniform standards for environmental plans, address enforcement issues, and set environmental quality goals. Interestingly the EMA does not require provinces to develop long-term strategies. However, the government will provide funding for those provinces that are developed long-term strategies. Provinces are mostly responsible for supervising municipalities and water boards. Municipalities are primarily responsible for licensing of industrial plants, soil cleanup, sewage services, and refuse collection and recycling.

On July 10, 2009 the national government signed a covenant; 'Convenant Bodemontwikkelingsbeleid en aanpak spoedlocaties'. This covenant represents an important step in the development of Dutch soil policy. The signing of the covenant has led to a further shift in responsibilities at the national level to provinces and local governments as well as water bodies (Agentschap.nl, 2012).

5.3.3.2 Contaminated site management in the Netherlands:

The Dutch soil policy has changed fundamentally in recent years. The purpose of these changes is to prevent and deal with soil pollution in the Netherlands and also to use the soil consciously and sustainably at the same time. For example, many of the central government's responsibilities have shifted to the provinces, district water boards and municipalities. Moreover, the Dutch central government is in favour of a comprehensive approach to environmental policy and spatial planning, which increases the responsibilities of the decentralized public authorities. In addition to preventing pollution and cleaning up contaminated soil, the soil policy is also aimed at other forms of damage that affect the soil, such as erosion, drought and decreasing biodiversity.

The Netherlands has many laws and regulations (See table 9). Two of the most important laws that serve as the foundation for Dutch soil policy are the Soil Protection Act (Wet bodembescherming - Wbb) and the Environmental Protection Act (Wet milieubeheer - Wm). The Soil Protection Act [Wbb] contains general rules to prevent soil contamination (Agentschap.nl, 2012), as well as remediate existing historical contaminations. The Environmental Protection Act [Wm] is the most important environmental law, which establishes that permits must be obtained before certain activities may be performed. The Soil Protection Act makes a distinction between a severely contaminated soil, lightly contaminated soil and clean soil (RIVM, 2006):

- Severely contaminated soil must theoretically be remediated. The statutory soil remediation regulations in the Netherlands include: intervention values (norms) above which remediation must take place, financing agreements and regulations about monitoring the national situation concerning sites with severe soil contamination.

- Slightly contaminated soil must be continuously managed. For example, there is legislation on moving and reusing soil and dredging's and using or reusing stony building materials;

- Clean soil must remain clean. The statutory prevention regulations in the Netherlands concern the following: storage of liquids in underground tanks, discharging liquids on or in the soil, disposing of wastes and usage rules for animal manure, sewage sludge and compost. In addition, soil protection measures can be imposed on companies via the Environmental Management Act.

It is generally assumed that before 1975 people or companies could not have been aware of the fact that activities might contaminate the soil. Consequently, all remediation costs for a contamination caused before that date, in principle, are covered by the state government (Agentschap.nl, 2010). This does however not completely exclude contributions from companies in respect of contamination caused prior to 1975. If the polluter had already been aware of the severe danger of contaminating substances, and putting these

substances directly or indirectly into the soil could already have been seen as a culpable act, the 'polluter pays principle' is still valid.

Year	Act
1983	Soil Clean-up Act (Interim)
1987	Soil Protection Act
1994	Soil Protection Act
2006	Soil Remediation Circular
2007	Soil Quality Decree
Other Regulations:	Waste Disposal Act, Groundwater Act, Surface Water Pollution Act, Chemical Waste Act, Nature Conservation Act, Air Pollution Act, Fertilizer Act

Table 9: Important Acts in Dutch Law regarding sustainable soil management

The local authority is encouraged to formulate its own soil quality aims in a Soil Ambition that may relate to all the soil the competent authority is responsible for, or may be limited to a local spatial development. The Soil Ambition directly relates to the current and/or future function of the soil: the land use. The competent authority – the municipality, the province or the water board – is responsible for the formal acceptance of the Soil Ambition. Apart from the 'chemical' quality, the soil is also defined in terms of its physical property and ecological properties, the geological, archaeological and culturally historic value, the soil threats (e.g. erosion, depletion, salinization) and the use of the soil for other purposes (e.g. mining, production of drinking water, storage capacity). It is up to the competent authority to define the terms of local relevance, all of which must be taken into account when developing a local Soil Ambition.

5.3.3.3 Summary

The partnership for the Utrecht redevelopment project CU2030 is characterized by public authorities and private actors. The initial analysis of the key partners has determined the Gemeente Utrecht to be a key player in the partnership. Its status has resulted in a top-down imposed arrangement of policies where the Gemeente has stimulated the other actors to join in a collaborative partnership. Interestingly no higher authorities, such as the EU or even the national government are listed as partners for the project. The covenant on 'Bodemontwikkelingsbeleid en aanpak spoedlocaties' explains this as it represents the shifting of responsibilities towards lower governmental levels. For sustainable development this can be seen as an important development, especially with regards to soil management, as the local government is most affected by the issues caused by poor soil development. By allowing those most affected and closest by the soil problems to gain responsibility, the likelihood for innovative solutions grows.

Variables	Description
Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • Not all the actors have direct goals for soil management, but are in favor of revitalizing the inner city area. Power: • Leadership is displayed by the Gemeente Utrecht who over the years have consistently promoted redeveloping the area. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory, • Communication tools for soils are still being developed, but there is a clear recognition of the interrelatedness between soil and groundwater as well as soil and energy.

Table 10: CU2030 Institutional Integration features

5.3.4 Policy-content features:

In the seventies the concept of the compact urban city prevailed in larger urban areas in the Netherlands (Sorensen et al., 2004, p.162). The idea emerged in order to reverse the de-urbanization trend. It was seen at the time that the intense use of space, diversity and multi-functionality were essential components of a city which would be retained by considering the compact planning concept. The compact city would offer advantages; limit the sprawl of urban centres, reduce traffic, improve accessibility and improve the quality of urban life (Sorensen et al., 2004, p.162). In terms of sustainability the burden on the environment was expected to be lessened due to less private transportation which would lead to lower levels of air and sound pollution.

However some autonomous developments have countered the effects promised by compact city supporters including a demographic shift in households where people now have preference for high-quality homes on spacious lots, and a change in traffic behaviour as affluence has contributed to a growth in car sales. An important lesson can be drawn from this, namely that autonomous developments such as economic growth and demographic change can undermine the desired outcomes of urban planning strategies. This has led authors such as Thomas and Cousins (1996), Welbank (1996), Jenks, Burton and Williams (1996) conclude that sustainable development, sought through compact urban development, is normative rather than rational i.e. favourable outcomes only if no significant autonomous developments take place. The failure of the compact city design to align with the concept of sustainable development is because it does not sufficiently account for temporal and spatial dimensions. Having said this, drawing up a strategy for sustainable development is not easy because of uncertainties due to development of technology and changes in society. Furthermore some actors are not necessarily interested in sustainable development if it requires an adaptation in lifestyle (Davidson, 1996).

In the nineties integration began to bring various policy sectors in the Netherlands together (Sorensen et al., 2004, p.169) with the introduction of 'omgevingsplanning'. The planning principle covers spatial planning, water management, policy for traffic and transport and environmental planning. The planning eventually brought with it the creation of provincial plans and the area specific policy approach. The CU2030 project fits within the area specific policy approach, which aims to advance issues that have stagnated within the traditional policy framework. The area specific approach examines a unique issue within a certain location (Sorensen et al., 2004, p.171) and considers all aspects of that issue.

For the CU2030 project the issue of soil contamination was taken as a starting point as a unique issue. Subsequently a redevelopment plan was created that took into account the socio-economic effects of different

soil management strategies. In this research the specific advantages related to the policy content features of this approach are studied through examining the key elements of 'time', 'knowledge', 'resources' and 'environmental policy'.

5.3.4.1 Summary

The study of policy content features offers an interesting and unique perspective on the CU2030 redevelopment project. The top-down approach to redeveloping the station area as observed earlier has resulted in the development of important procedural factors. The procedures followed during this specific project prove the importance of a normative stance towards the environment that recognizes the qualities of it. The qualities of the environment are listed in a set of indicators which are embedded in legislation. Furthermore the procedures point to the importance of planning a project, taking sufficient time to analyze impacts of different land-use changes. Finally the procedures of engaging beyond an area-based development towards a regional development strategy by including actors that offer different resources was also considered important to ameliorate the soil sustainability in the project area.

Variables	Description
Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes, and the impacts of those changes on soil. • The time between project initiation and project construction was 8 years. Planning a project is a crucial step. Knowledge: • Scientific information is considered important. In Dutch legislation significant progress has been made to determine 'bad' and 'good' soils and understand soil potential and function. • Advisory committees constitute external actors to the project. In this case CityChlor, as well as the architect firm Benthem Crouwel have been identified as key advice organizations. Resources: • Actor expertise is mostly limited to the service sector. The actors rely on engaging with the public to sell services. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources by considering a regional scale. In this way the functions of soils and its values are shaped by a larger pool of knowledge. • Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.

Table 11: CU2030 Policy-content Integration features

5.4 Conclusion

Two important lessons can be drawn from the brief historical description of the project development. First it is evident that what constitutes public space and what does not is difficult to fully delineate from each other. This led to frictions on the costs involved in redeveloping certain areas. Second it is evident that the involvement of the public was able to strengthen the need for redevelopment. Although it is hard to judge the extent of pressure exerted by the public it seems that their involvement helped to bring environmental qualities to the forefront due to the fact that they chose for 'more green qualities'.

The study of governance is important to provide an insight into the project development as a whole. A descriptive analysis conducted on the integrated approach for the Utrecht inner city redevelopment recognizes integrative efforts within actor, institutional and policy-content features. The conclusion is based on the fact that the five main partners involved in the project have worked together to distill common goals and ensure benefits for each other for engaging in the project. Variables covering time, knowledge, resources and environmental policy have been fully considered. In the long-term for example it is expected that soil quality over the large project area will improve. Although not addressed, the impacts of improved soil quality are likely to lead to even more beneficial socio-economic advantages in the future. Knowledge networks are extensive and consist of external and internal actors. Attempts have been made to disseminate the knowledge across a broader audience, although it was recognized that there was room for improvement. In terms of resources, the energy potential from soils is shared by the partners but are guided by EIA and indicator standards. Finally, the environmental policy is based on the application of using a larger scale, reflecting an ecosystems approach to management. The result being that the functions of the soils in the project area are shaped by a larger pool of knowledge.

In terms of institutional features the project is integrated well because there are objectives for soils which have been refined for regional implementation. Leadership to tackle soil issues is also present which is necessary in project developments which want to overcome issues. Lastly, rules and regulations have pointed to the diffusion of tasks, which allows for the other partners involved in the project to mainstream their concerns on the issues at hand.

5.5 Discussion

5.5.1 Success factors of Integrated approach

Several factors found in this case study have resulted in an integrated approach which led to more sustainable soil management during urban redevelopment. These key factors are a high level of political commitment to manage the integrated process, the use of a long-term time perspective which involves the monitoring of soil conditions through time and allowed for sufficient gathering of relevant scientific information, and the formalization of a partnership between public and private spheres affecting the accountability mechanisms for each partners' use of soil.

High level political commitment for soil management can be said to indirectly affect the process of achieving an integrated approach because it legitimizes administrative agreements for urban redevelopment. Indeed all the partners interviewed in this case study were determined to partake with the centralized government plans which involved implementing the biowasmachine.

Time has been an important factor in realizing the current results of sustainable soil management. The planning process started as early as the 1980s and continued until 2002 when a master plan was finally created. Finalizing these plans took another 8 years as project construction started in 2010. The benefits of taking sufficient time to plan the final project are diverse. Taking sufficient time allowed for sufficient data to be collected about the state of soils in the inner city area. Furthermore it allowed for a stakeholder analysis to be carried out, and important agenda points and objectives for inner city redevelopment to be made and synchronized with the scientific data collected.

It is clear that on a general level horizontal integration efforts have taken place between the public and private. A mix of 5 partners from the public and private sphere took part in the project development. Partnering with each other contributed to creating an understanding of different interests for redeveloping the inner city area

shifting the focus of redevelopment away from sector-bound goals towards regional and even national goals. The inclusion of more interests and goals also led to a shift from the consideration of just a single development phase, to the consideration of the entire development process from 'initiative' to 'management'. Furthermore the partnership also contributed positively to the sharing of knowledge which led to the acknowledgement of costs and benefits related to remediating the soils in the inner city area.
By focusing on regional and national goals rather than sector specific goals, and by considering the development cycle in its entirety, the scope of the project was increased. This resulted in soil pollution and the involved risks being examined from a different perspective. The risk calculations of soil pollution over a larger area and over a greater time frame allowed for the goals and interests of the partners to be adjusted. In turn this affected the cost and benefit calculations of the partners to remediate soils in the inner city area prior and during construction.

In summary it can be said that the integrative process has occurred in the planning/initiative phase for the Utrecht CU2030 project. The central government as a partner legitimized the interest in soil management and helped to facilitate administrative agreements as early as the 1980s to establish the objective of clean soils in the inner city. The use of a partnership between the public and private sectors resulted in expanding the development area, recalculating risks, re-evaluating costs and benefits and broadening the value concepts of clean soils. These factors have played an important part in the sustainable redevelopment of the inner city district of Utrecht.

5.5.2 Improvements for Integrated approach

What is noteworthy is that as a whole the full commitment by private actors for implementing the biowasmachine and the necessary heat and cold system to remediate soils has not been realized. One of the reasons for not being fully committed lies in the fact that the biowasmachine focuses on chlorinated compounds in soils over other sources of pollution such as heavy metal contaminants. These contaminants are also present in the inner city area of Utrecht. Measures used to ensure soil policy integration provide possible insights as to why. Most interesting are the coordination and communication mechanisms about soils. When questioned, the private partners Corio and ProRail, acknowledged a lack in the availability of data. Similarly the private partners acknowledged that there were insufficient consultation and participation forums about soils during the initiative/planning phase. The lack of these measures is evidence of the failure to share specific knowledge. When questioned about this, the government informed that a database was being developed to share important data regarding soils. An important lesson to be learnt from this is that it is necessary to create a platform where the involved partners can contribute knowledge and information openly and in a transparent manner. The sharing of knowledge through an open platform by each actor could have led to other technical measures to be implemented which would take on board the other types of pollution present in the soils of the inner city area.
The sharing of knowledge with external parties is also important. While this does not necessarily have to take place on the same platform as the main partners, the sharing of sufficient information could lead to more insights and other items to be integrated into the project for sustainability purposes. Insights from an interview conducted with architect Benthem-Crouwel point to sub-optimal sharing of information leading to project design features that did not directly contribute to relieving pressures on soils.

Several measures are expected to contribute to more integration which would lead to improvements in sustainable soil management:

- More societal backing for soil management
- More coordination between partners and external actors
- Increased communication about soils
- Consultation and participation forums about soils

Chapter 6: Case Study – Gent Sint-Pieters Station

Important questions answered in the case studies are the following:

- **What ambition do governments have for soil management at the local /regional level**
- **What measures and instruments can be identified with regards to sustainable soil management**
- **How are governments at the local/regional level striving for integration**
- **What results were achieved**
- **How was the process organized and executed**
- **What is the applied mode of governance**

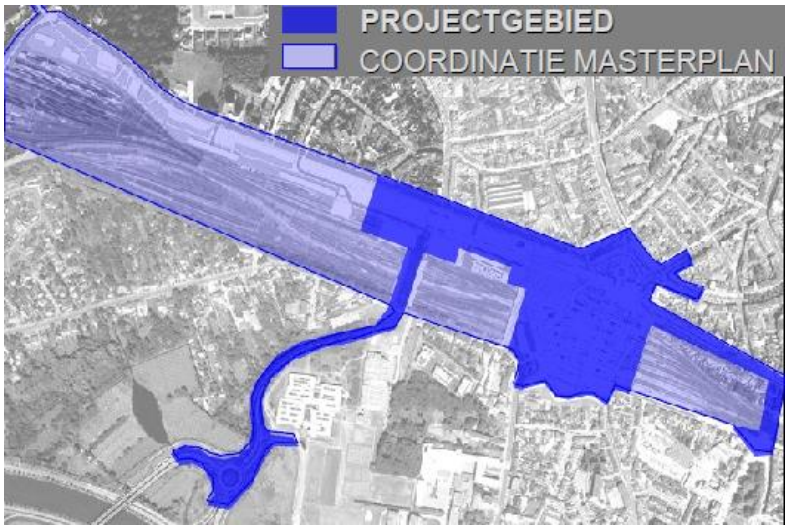
6.1 Project Background Information

The Gent Sint-Pieters Project, situated in the province of Vlaanderen in Belgium concerns the restructuring of the area around Sint-Pieters train Station including the station itself. The station itself was built in 1913 and it was recognized that it was not designed to handle the current capacity of commuters and inhabitants of Gent. The project as a whole therefore now involves creating 82,500 square meters of space for offices, 110,000 square meters for apartments and 20,000 square meters for recreation and shops as well as improvements to the rail infrastructure (GentSintPieters, 2012).

Project Gent Sint-Pieters	
Total (expected) Investment costs	496 million euros
Start year initiation of project	1998
Start year construction	2006
Estimated completion	2021
Urban redevelopment area	8 ha
Population of metropolitan Gent	247,486 (approx.)
Partners	Stad Gent Eurostation NMBS-holding De Lijn Infrabel Agentschap Wegen en Verkeer

Many cities in Flanders are developing projects on strategic sites such as railway station areas, waterfronts, inner cities, abandoned industrial sites with the aim to make cities more attractive for living and working (Coppens, 2007). These projects are mostly developed by public-private and public-public partnerships. The attention on such areas is partially the result of a shift towards a more strategic oriented spatial planning policy, and partially because of the new emphasis of the Flemish Urban Policy on the physical aspects of urban development with new policy programmes and subsidies. The Gent Sint-Pieters project, situated in the province of Flanders in Belgium concerns the restructuring of the area around Sint-Pieters train station including the station itself. The station which was built in 1913 was not designed to handle the current capacity of commuters and inhabitants of Gent. It was also realized that there were large quantities of unused land which, when developed, could be of significant value. In total 6 partners are involved with the plan; Stad Gent, Eurostation, NMBS-holding, De Lijn, Infrabel and Agentschap Wegen en Verkeer.

The city of Gent recognizes the need for sustainable development. It understands the need to redevelop the station area whereby the fundamental themes in sustainability are addressed; people, planet and prosperity. Soil pollution in the project area was not determined to be a big threat. In Flanders, OVAM, which is the public waste agency of the province, is responsible for waste management and soil remediation. It did not determine threatening issues related to soil contamination in accordance with the land use for most of the project area. In the MER (Environmental Impact Assessment) only one site was required to remediate its soils, due to risk of contamination spreading (see MER, 2005, chapter 7.5).



In 1998 a plan for the Gent Sint-Pieters station and surrounding city redevelopment was eventually initiated. The plan is seen to be an integrated one which aims to improve the sustainability of the inner city. Important details of the plan are summarized in the table. The redevelopment includes adapting the neighbourhood and the station to the needs of the 21st century (eurostation, 2012). The construction of a renewed train, bus and tram station, an underground car park and bicycle sheds, a connecting road with the R4, the creation of a green nature area and sustainable real-estate developments are the major challenges.

6.1.1 Actor description

The plan that was initiated in 1998 and completed in 2005 includes 6 main partners:

- Stad Gent is the government of Gent. It is a public organization whose task involves ensuring the wellbeing of the citizens of Gent as well as the wellbeing of all visitors to Gent.
- Eurostation is a real-estate developer, founded in 1992 and owned by the national railway company. Its task is to renew railway stations in Belgium, and to increase the value of the real estate property of the railway company.
- De Lijn is a regional transport company, involved in the project with an interest to increase the quality of its transport services, by offering a better tramway and bus accommodation and a better integration with rail transport.
- NMBS-holding is a largely state-owned national organization and gives direction to its two subsidiary organizations; Infrabel and NMBS. Infrabel is responsible for maintaining the rail infrastructure in Belgium, while NMBS is the main organization in charge of exploiting trains.
- Infrabel is a public organization owned by NMBS-hoding, and is responsible for maintaining the rail infrastructure in Belgium.
- Agentschap Wegen en Verkeer (AWV) is a public state-owned provincial organization responsible for safe and sustainable mobility of all road users in the province of Flanders. It manages and maintains the road infrastructure while providing information on transport-related issues.

The main partners identified comprise of *public* actors. The development of a public partnership according to the literature brings with it advantages; Sharing Responsibilities & Diluting Risks, Increased availability of Resources, Increased Interaction, Increased Rational Democratic Decisions. A description of the historical development and project innovations will follow, providing insights into the actual advantages of this partnership configuration in comparison to the perceived advantages.

6.2 Project Innovations

Several partners are involved in the Gent Sint-Pieters station project. These are the Stad Gent, Eurostation, De Lijn, NMBS-holding, Infrabel and AWV. The involvement of these partners offers several advantages; 1) A larger redevelopment area can be considered, 2) More resources are available (monetary and knowledge), 3) More debate is possible (on better soil management), 4) Risks for soil use is diluted across actors. Despite these advantages no particular innovative procedures have occurred to conserve or preserve soils. Nor have procedures occurred where the partners have combined their efforts to remediate a larger area of soil in the project area.

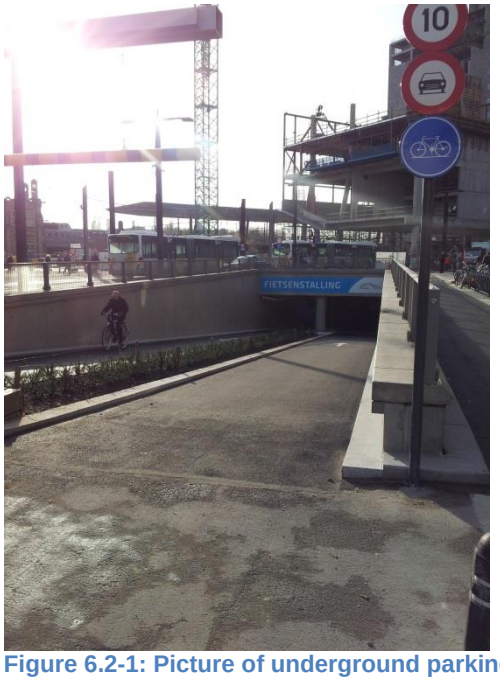


Figure 6.2-1: Picture of underground parking in Gent (2012)

Soils and particularly soil pollution are not considered to be a fundamental problem in the Gent Sint-Pieters station project. In fact, large excavations are taking place at present in order to create underground parking for both cars and bicycles, and to place other infrastructures for trains (GentSintPieters, 2012). These excavations have several effects as it involves the removal of large quantities of good soils. Moreover, the new facilities being built on the excavated sites lead to soil compaction, rendering them unusable hence unsustainable for future use.

In the wider scheme of soil management the project does involve the redevelopment of brownfield areas. This relates to improving the economic value of land as well as the optimization of space in dense inner city areas.

The soils that are excavated are not disposed of, rather they are reused to make sound barriers and to help with other infrastructural developments nation-wide. It remains unclear to which extent the excavated soils will retain their properties when fulfilling their new functions. Another soil management aspect includes the fact that the project involves compensating for some land loss by creating a park in the near vicinity of the project.

6.3 Analysis

6.3.1 Historical Project Development

Plans for redevelopment started in 1998. Euro Immo Star (IMS), which is part of Eurostation, commissioned the redevelopment of the central city area to make use of unused land from NMBS and reorganize the Maria Hendrikaplein on the south side of the station. During the planning process the project grew in scope suggesting the redevelopment of the station as a whole in order to increase its capacity for transport (Eurostation, NMBS). This implied the need for more parties to become involved with the project. A first masterplan was developed in 1999 (Coppens, 2007). This plan set the basic structure of the current development scheme. The design made a proposal for a renewed railway station, in which the parking for 2000 cars and 5000 bikes and the stops for different transport modes would be integrated in a covered multi-level public square under the existing rail tracks (Coppens, 2007). The design also provided a 290.000 square meter high-rise block development along the Fabiolalaan, an existing road parallel to the railway tracks. It argued the necessity of a new direct road connection between the R4- the outer ring around Gent – and the new car parking. Further it suggested some development strategies to increase the density of the existing urban infrastructure in surrounding the station. The plan however could not convince all the stakeholders. The city for instance, had serious doubts on the volume of the real-estate development and the quality of the public space. Other partners had their doubts on the technical feasibility of the renewal of the railway station.

Between 2000 and early 2002, the planning process did not make a lot of progress (GentSintPieters, 2012). One of the reasons was the lack of political support on different policy levels and the lack of resources among the partners at the time, consisting of Eurostation and NMBS-holding, to finance the project. In 2002 however the planning process took a renewed start. A new steering committee was installed with the 6 partners (AWV, the city of Gent, NMBS-Holding, Infrabel, the Lijn and Eurostation), this time with the influential mayor Frank Beke as chairman.

The project plan brought with it many technical, financial and juridical aspects. The number of technical tasks was extensive, not only in terms of design concerning the underground building aspects, but also in terms of the juridical procedural aspects (Coppens, 2007). In order to implement the plan, the partners had to make an environmental impact study, in which the impact of every possible alternative had to be studied. In addition they had to make a new zoning plan and develop the building permits required in the next phase of the development.

Mid 2004 saw the 6 partners signing an agreement which stipulated the specifics of the project design, the financial aspects, and the different task and responsibilities of the partners (GentSintPieters, 2012). It could be argued that until the agreement, there was a high degree of uncertainty. None of the partners had made hard binding commitments in the past, and every partner could exit the decision-making process at a relative small cost if the project would not meet their interests. But with the signing of the agreement the partners allied

their interests and sealed their commitments. It seemed that the remainder of the project was a matter of implementation and concise project management (Coppens, 2007).

In summary, a plan was designed that would be realized within the next 15 years. The chosen project manager was Eurostation, who would coordinate the realization of the project together with several partners including Stad Gent AWV, NMBS-Holding, De Lijn, and Infrabel.

6.3.2 Actor features

- Eurostation is seen as a 'player', in project with the highest interest in realizing/finishing the project, and a reasonable amount of power to ensure project goals.
- Stad Gent is also seen as a 'player' in the project as a whole. It has a high interest in the project largely for the economic benefits for the city, and it has a considerable amount of power to ensure that the project is pursued.
- DeLijn is identified as a 'subject', displaying interest in the project development for its goals of increasing its transportation capacities, but with little power to influence final project decisions at a higher level.
- NMBS-holding is identified as a 'player', as its land is being redeveloped. It therefore has a considerable interest in the project and power to ensure the continuation of developments on its land.
- Infrabel is a 'subject', displaying interest in the project for the purposes of expanding the rail network and being involved with new technological railway advancements but little power to influence the full scope of the project.
- Agentschap Wegen en Verkeer (AWV) is identified as a 'crowd' in the project. Its task is limited to ensuring that specific safety and transport aspects of the plan to not generate negative impacts in those sectors. Its' power to influence decisions in terms therefore bound to its own sectoral goals as well as its interest in the project as a whole.

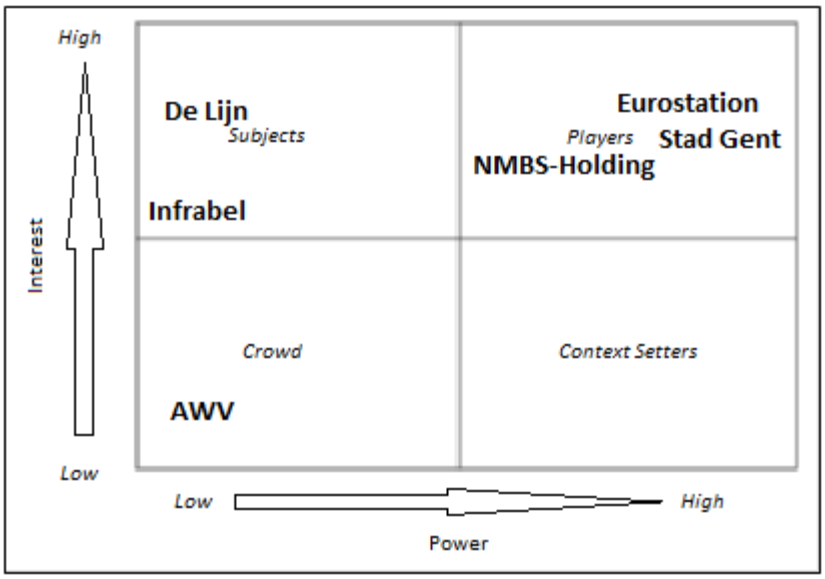


Figure 6.3-1: Gent Sint Pieters Power-Interest grid

6.3.2.1 Summary

The main actors in the Gent Sint-Pieters partnership have been depicted in a power-interest grid. Their position has been based on information gathered during interviews and key mission statements found on their respective websites. By depicting the partners on such a grid it is possible to hypothesize about the likelihood of the project development to take a certain route towards various goals. Given that there are three actors

listed as 'player' in this project it is likely to see the project evolve taking large considerations for their goals and ambitions over the other partners.

Variables	Description
Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof	Actors: • The actors consist of only public actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate about the project. Interaction: • There are three partners in charge to create an identity about soil and communicate the importance of them.

Table 12: Gent Sint Pieters Actor Integration features

6.3.3 Institutional features:

6.3.3.1 Contextual Environmental Policy Background:

Belgium is a federal state and environmental policy is mainly a regional matter (NICOLE, 2005). A consequence of this is that the three regions (Flemish, Walloon and Brussels Capital Region) have their own specific legislation on soil remediation. In the Flemish Region, there is the Decree on Soil Remediation and Soil Protection of 27 October 2006 which replaced the Decree on Soil Remediation of 22 February 1995 (NICOLE, 2005). In the Walloon Region the Decree on Remediation of Polluted Soils of 1 April 2004 is applicable. Finally the Ordinance on the Management of Polluted Soils of 13 May 2004 deals with the situation of polluted soils in the Brussels Capital Region.

6.3.3.2 Contaminated site management (in Flanders):

The Flemish region has taken responsibility for contaminated site management by creating a national inventory of polluted and contaminated soils. This task is carried out by two organizations; there is a "ground information register", managed by the OVAM (the public agency for waste and soil in the Flemish Region), and a "Register of risk activities", managed by the municipalities (OVAM, 2012). The information provided consists of any available information on any ground (soil type, use, ownership, soil investigations etc.) and can be accessed openly by everyone. In the case of sale of land, or change of use there are administrative and legal procedures which must be abided which involve providing information about the land. Voluntary information about the land is also strongly encouraged. Information is provided to OVAM, which acts as the public authority, and the acquirer of the land.

The Flemish legislation foresees different kinds of liability and makes an important distinction between new, historical and mixed soil pollution (NICOLE, 2005):

1. New soil pollution is pollution that originated after the entry into force of the 1995 Soil Remediation Decree (i.e. after 29 October 1995);
2. Historical soil pollution is pollution that originated before the entry into force of the 1995 Soil Remediation Decree (i.e. before 29 October 1995);
3. Mixed soil pollution is pollution that originated partially before and partially after the entry into force of the Soil Remediation Decree

New soil pollution must be remediated if the soil pollution exceeds the soil remediation standards set out in Annex 4 to the VLAREBO. For the moment there are 5 different sets of remediation standards for soils, depending on the land use function of the soil. The remediation standards are the strictest for "green" forms of land use (e.g. nature and woodland) and the most tolerant for industrial uses of land (e.g. industrial area, area for waste disposal). However for ground waters there is a uniform remediation standard. The 2006 Soil Decree specifies that these soil remediation standards shall correspond to a level of soil contamination which prevents

a considerable risk of harmful effects for man or the environment, by taking into account the characteristics of the soil and the functions it fulfils.

The principle with historical soil pollution is that remediation only needs to be carried out if the soil pollution constitutes a “severe soil contamination”. By “severe soil contamination” is meant: “soil contamination which constitutes or may constitute a risk of adversely affecting man or the environment. When evaluating the severity of the soil contamination, the following factors shall be taken into account: a) the characteristics, functions, uses and properties of the soil; b) de nature and concentration of the contaminating factors; c) the possibility of dispersion of the contaminating factors.

For mixed soil pollution OVAM shall decide on the actual division. The part considered as new soil contamination shall be treated in accordance with the provisions which are applicable for new soil contamination and the part considered as historical soil contamination in accordance with the provisions which are applicable for historical soil contamination. If it proves impossible to carry out a separate descriptive soil investigation or separate soil remediation for each part of the soil contamination by using the best available techniques not entailing excessive costs, only the provisions which apply to the largest part of the soil contamination shall apply.

6.3.3.3 Summary

The partnership for the Gent station redevelopment project is characterized by public actors. The initial analysis has determined three key ‘players’ in this partnership arrangement – Eurostation, Stad Gent and NMBS-Holding. This represents half of the actors in the partnership. Of those three actors in the partnership, Eurostation and NMBS-Holding operate with a national scope. Stad Gent also has ties with the province and the national government. As such the project can be said to be steered through a top-down governance arrangement where the national and sub-national ‘players’ seemingly determine the project and its scope to which the other actors have to abide.

Interestingly no ‘context setters’ have been identified in this project. The absence of a context setter could result in the lack of opinionated actors that are able to take actions for other benefits. These other benefits could hypothetically include alternative ideas with respect to soil management in the project area. Furthermore, the lack of context setters hints at the lack of decentralization efforts which in the literature are considered important in order to share risks and responsibilities.

De Lijn, Infrabel and AWV are all characterized by lower power to make a difference to the decision-making process. The result is that the main objectives for soil management are therefore confined to the redevelopment of brownfield sites through revitalization efforts as determined by national policies and acts.

Variables	Description
Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • None of the actors have direct goals for soil management but do promote brownfield redevelopment. Power: • Leadership is displayed by three main players. Eurostation is the main coordinator for the project however. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory, • Communication tools for soils are still being developed. There is recognition of the interrelatedness between soil and groundwater.

Table 13: Gent Sint Pieters Institutional Integration features

6.3.4 Policy-Content features

The project reflects the idea of compact urban planning with the construction of underground parking for cars and bicycles and the creation of a multifunction land use area. The compact city design has prevailed in larger urban areas in Europe over the years, and as such this project is not significantly different from other large urban city developments.

The scientific base for urban development on soils is provided by OVAM (OVAM, 2012). OVAM has as a main task to decide whether or not additional measures are needed for soils prior and during the development of the project. It is mandatory for OVAM to perform certain soil studies during the sale or transfer of land in accordance with VLABERO regulations.

The policy-making procedure through OVAM reflects a sectorial approach to decision-making guided primarily by legislation, permits, norms and standards. For soil management purposes the role of OVAM is of significant influence. However, it is interesting to note that OVAM just like the other project partners finds itself guided by the public sector. The public sector thus plays an overwhelming role in this project and could be a factor in limiting confrontation from the project partners with each other to support a greater number of sustainable alternatives.

6.3.4.1 Summary

The study of policy content features offers an interesting perspective on the Gent Sint-Pieters redevelopment project. There are many top-down elements in the redevelopment approach of the station area. The observed procedures as described earlier have resulted in the development of a project that promotes the national goals of the region over the local ones.

The procedures followed by OVAM during this specific project shed light on the use of a more technical stance towards the environment over a normative one that could recognize different qualities that are not included in the indicators used; the qualities of the environment are listed in a set of indicators used by OVAM which are embedded in legislation. Having said this, the procedures point to the importance of planning a project and taking sufficient time to analyze impacts of different land-use changes. Also the procedures of engaging beyond an area-based development towards a regional development strategy by including actors that offer different resources was also considered important to ameliorate the soil sustainability in the project area.

Variables	Description
Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes, and the impacts of those changes on soil (OVAM). • The time between project initiation and project construction was 8 years. Planning a project is a crucial step. Knowledge: • Scientific information is used. In Belgian legislation indicators are used to determine 'bad' and 'good' soils and understand soil potential and function. • *Advisory committees were not directly identified. The main partners aim to engage other actors throughout the project development (GentSintPieters)* Resources: • Actor expertise is limited to the public sector. The actors all engage with the public to provide services which cover various infrastructures. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources but has extended this beyond the region through considering the national scale. In this way the functions of soils and its values are shaped by a larger pool of knowledge. But the impacts do not remain local. • Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.

Table 14: Gent Sint Pieters Policy-Content Integration features

6.4 Conclusion

The governance mode in this project as a whole seems to be guided by strong centralized characteristics. The effect of this is that integration of policies and goals, although present, is confined to primarily serve national interests.

Some important lessons can be drawn from the historical project development. First it is recognized that there is a need for clear administrative binding agreements. The project was for some time criticized for being unstable as parties were able to pull out without bearing high costs. It is also evident that the technical and judicial implications of a redevelopment plan such as proposed by Eurostation require expertise from a mix of angles. Partnering is thus an essential step in this redevelopment project.

The study of governance provides an insight into the project development as a whole. A descriptive analysis conducted on the integrated approach for the Gent inner city station redevelopment recognizes integrative efforts within actor, institutional and policy-content features. This conclusion is based on the fact that the main partners involved in the project have collaborated to find common grounds and ensure benefits for each other for engaging in the project. Variables covering time, resources and environmental policy have been fully considered. Yet the factor covering knowledge is somewhat limited.

In the long-term it is expected that soil quality in the project area will not be significantly affected by current developments. Resources from public authorities have contributed to refining indicators for soils which are used in mandatory EIA frameworks. Furthermore, in terms of resources, the socio-economic gains for sharing environmental responsibility within a partnership setting are expected to increase and be shared by the partners. The environmental policy is based on using a larger scale, reflecting an ecosystems approach to management. The result being that the functions of the soils in the project area are shaped by a larger pool of knowledge. Although knowledge networks are present I was unable to identify specific external advisory committees to the project. It has been observed that attempts have been made to disseminate the existing knowledge across a broader audience, yet the procedures for doing so offer room for improvement. This was especially evident when examining the public nature of the partners. While the aim is to engage with other actors throughout the later project development stages, these actors are likely to be affected by a lack of holistic knowledge about the project area from the beginning stages.

In terms of institutional features the project is integrated moderately well because there are objectives for soils which have been refined for regional implementation. Leadership to tackle soil issues is present which is necessary in project developments which want to overcome issues but it is not a primary goal; instead brownfield redevelopment is. Lastly, rules and regulations have pointed to some diffusion of tasks, which allows for the other partners involved in the project to mainstream their concerns on the issues at hand, but as mentioned afore the public nature of the partners could act in a negative way as the organizations are similarly funded and organized. The result being that the involved organizations may be less willing to confront each other.

6.5 Discussion

6.5.1 Success factors of integrated approach

Several factors found in this case study have resulted in an integrated approach which has helped to realize a moderate level of sustainable soil management during urban redevelopment. These key factors are the use of a long-term time perspective which involved overseeing the effects of the project for the end-users and required sufficient gathering of relevant scientific information, and the formalization of a partnership between public spheres. This impacted the accountability mechanisms for each partners' use of soil or exploitation of it and the cost and benefits for pursuing with the development of the project.

Time has been an important factor in realizing the current results of sustainable soil management. The planning process started in 1998 and continued until 2004 when a master plan was finalized. Finalizing the initial plans took 7 years as project construction eventually started in 2006. The benefits of taking sufficient time to plan the final project are diverse. Taking sufficient time allowed for sufficient data to be collected about the state of soils in the inner city area as well as the project area. It allowed for development plans to assess the risks of certain land uses in relation to soil use and function - in the Environmental Impact Assessment several alternative project development scenarios were tested using a risk-based assessment which is a typical requirement in Flemish policy.

The final plan required soil remediation of one sight. Other soil matters involved the removal of a substantive quantity of soil, in an exploitative fashion, to realize the technical underground parking garages. An alternative use for the soil was included in the impact assessment [section 7.5]. In this sense soils are sustainably managed, because rather than being exploited and disposed without using its scarce and valuable properties, the soils and its qualities are conserved. The conservation of soil is realized by using soils to make sound barriers. The sound barriers in turn contribute to social sustainability for the citizens of Gent as it is expected to positively impact the living quality in the area. Other uses for the exploited soil involve using it in other projects.

The time aspect also allowed for an improved stakeholder analysis to be carried out. In the early stages of project initiation only two main stakeholders were involved (Eurostation and NMBS-holding), but more stakeholders became involved during the development of the initiation. This meant important agenda points and objectives for inner city redevelopment could be better established and coordinated. Additionally these could be better synchronized with the total scientific data available for the area.

It is clear that on a general level sound horizontal integration efforts have taken place between the public organizations. A mix of 6 partners from the public sphere took part in the project development. The public focus involves advantages and disadvantages. The advantages come in the form of facilitating administrative agreements which is considered an important part of an integrated approach. Clear roles are needed during project development to prevent overlapping and enhance the project efficiency.
Partnering with each other also contributed to creating an understanding of different interests for redeveloping the inner city area shifting the focus of redevelopment away from sector-bound goals towards regional and even national goals. The inclusion of more interests and goals also led to a shift from the consideration of just a single development phase and single construction, to the consideration of the entire development process from 'initiative' to 'management' and the consideration of a larger spatial development. Furthermore the partnership also contributed positively to the sharing of knowledge which led to the acknowledgement of costs and benefits related to up-scaling the project area.
By focusing on regional and national goals rather than sector specific goals, and by considering the development cycle in its entirety, the scope of the project was increased. This resulted in soil pollution and the involved risks being examined from a different perspective. The risk calculations of soil pollution over a larger area and over a greater time frame allowed for the goals and interests of the partners to be adjusted. In turn this affected the cost and benefit calculations of the partners to remediate soils in the inner city area prior and during construction.
In summary it can be concluded that integrative urban processes have taken place throughout the project. The public partnership which involves the government at several levels has legitimized the project and also contributed to the interest in soil management because of the publics' duty to assure the wellbeing of its citizens. The public influence of the project has also helped to facilitate administrative agreements more easily including establishing the objective of clean soils in the inner city. The use of a partnership between the public agencies has resulted in expanding the development area, recalculating risks, re-evaluating costs and benefits and broadening the value concepts of clean soils. These factors have played an important part in the sustainable redevelopment of the inner city district of Gent Sint-Pieters.

6.5.2 Improvements for integrated approach

What is noteworthy is that the partners involved are mostly public agencies, although some are considered quasi-public-private organizations. The public-based partnership has several implications for the project. These implications come in the form of limiting the broader horizon of the project such that all contaminants in the soil are fully dealt with; only one site required soil remediation while other sites were considered polluted as well. While the above argued that the partnership contributed positively to the project, the public focus also brought limits with it. The objectives of areas in the vicinity of the project area for example consisting of some private organizations, which could hypothetically involve more soil considerations, have clearly been overlooked in the broader sense.

Measures used to ensure soil policy integration provide possible insights as to why. The use of knowledge for instance has been limited without the inclusion of the private sphere as a signatory party to the redevelopment. This has resulted in overseeing various soil issues of other parties. The rules and regulations for soil quality were also limited by the public scope and project-area scope which was considered in the final redevelopment plan. By limiting the project area and project scope, soil quality did not need to be strategically assessed for a greater mix of functional uses.

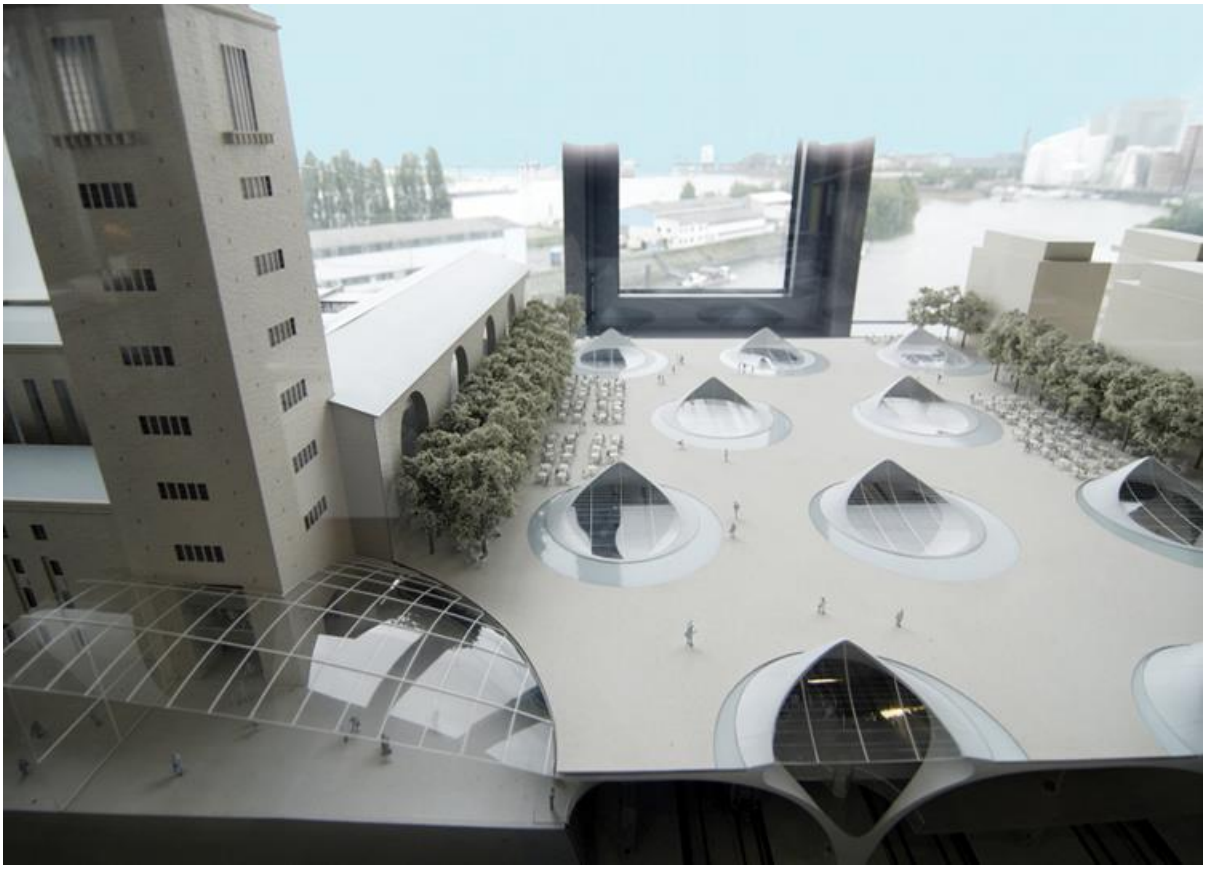
Several measures are expected to contribute to more integration which would lead to improvements in sustainable soil management:

- Involvement of private organizations
- Enlargement of project area to include a greater land-use mix
- Increased communication about soils
- Consultation and participation forums about soils
- Early involvement of external actors

Chapter 7: Case Study – Stuttgart S21

Important questions answered in the case studies are the following:

- **What ambition do governments have for soil management at the local /regional level**
- **What measures and instruments can be identified with regards to sustainable soil management**
- **How are governments at the local/regional level striving for integration**
- **What results were achieved**
- **How was the process organized and executed**
- **What is the applied mode of governance**



7.1 Project Background Information

For regional administrative purposes Germany is comprised of five states, namely Baden-Württemberg, Bavaria, Hesse, North Rhine-Westphalia and Saxony. In 1994, the city of Stuttgart, situated in the state of Baden-Württemberg in southern Germany, has pushed forward a plan concerning the restructuring of the area around main train station including the station itself. The redevelopment plan is known as Stuttgart S21 (Bahnprojekt, 2012).

The city of Stuttgart is one of the main industrial and commercial centers in Germany. Nevertheless, with its mountainous surroundings and existing infrastructure built in the 19th century, the railway linkage of Stuttgart remained behind the current standards in Germany, giving reason for the S21 project.

Important details of the project are summarized in the table below:

Stuttgart S21	
Total (expected) Investment costs	4.1 billion euros
Start year initiation of project	1994
Start year construction	2010
Estimated completion	2021
Urban redevelopment area	100 ha
Population of metropolitan Stuttgart	600,068 (approx.)
Partners	European Union The federal government (BUND) The state of Baden-Württemberg German Railway (Deutsche Bahn AG) The city of Stuttgart The Stuttgart Region

The project as a whole is extensive and complex. It combines plans for high-speed links from Stuttgart to other cities together with the improvement of local infrastructure and a replacement for the current terminal station (Bahnprojekt, 2012). The current 17-track station is to be replaced by an underground 8-track through-station (Ibid, 2012). Parts of the historic Paul Bonatz Hauptbahnhof building, the platforms and approach tracks will be demolished, and some of the land in the project area will be sold for development purposes.

7.1.1 Actor description

The final plan that was formalized in 2007 includes 6 main partners:

- The European Union – This is an international public organization that designs plans and initiatives for application at national scales. It has a 'strategic presence' in international affairs. It is comprised of a political partnership between 27 nations in Europe (EU, 2012).
- BUND - The BUND is the federal government of Germany. The BUND makes use of democratic principles to form a Cabinet. The Cabinet is made up of the Chancellor and the Federal Ministers. As a whole the Cabinet deals with important inter-ministerial issues such as the federal budget or tax reform and takes joint decisions on them (Bundesregierung, 2012).
- The state of Baden-Württemberg – the state of Baden-Württemberg is a public authority. Because the federal republic of Germany is a decentralized political system it means that there are several independent political levels (federal, state and local). Each of these levels has its own substantive jurisdiction, private finance and process of policy formulation.

- The Germany Railway (DB AG) – it used to be a state-owned organization but also acts in the private sphere for economic interests. It main goal is to facilitate transport between nodes and ensure the safety of passengers and cargo in doing so.
- The City of Stuttgart – The city of Stuttgart is a public authority characterized by a self-governance arrangement. Its main task is to represent the community citizens and ensure their wellbeing.
- The Stuttgart Region – Since 1994 the 'Stuttgart region' has been in existence. It is a public organization that includes, in addition to the state capital, five neighboring districts. The region comprises of regional councilors that are directly elected and entrusted with planning tasks and responsible for the implementation of tasks. Its significance is to add a weight to the urban-rural issues in the Stuttgart area in order to strengthen national and international competition (baden-wuerttemberg, 2012).

7.2 Project Innovations

In terms of project innovations regarding sustainability it can be discerned that the Stuttgart 21 project is certainly aiming to contribute to the principle. The project development aims to minimize the number of affected individuals by building a series of tunnels underneath the city of Stuttgart (Bahnprojekt, 2012). In turn the city will be less exposed to noise and the old tracks could be turned into an extension of the existing park and new commercial areas.

The S21 project has applied a soil management concept known as BOKS [see 7.3.3. institutional features], which essentially entails that as much relevant information about soil is gathered, such that any development decisions can be based on that information. Part of the concept stresses the importance of inner city development, favoring the use of 'bad' soils over 'good' soils. The primary goal of this concept thus aims to conserve soils. The secondary goal of the concept involves improving environmental quality through re-using soils whenever possible, or attempting to re-engineer important soil functions through greening the landscape with parks.

Apart from the above-mentioned innovations the project consists of a partnership, which according to the literature is of importance because it offers advantages in the form of ensuring that multiple objectives and interests are met. The benefit of a partnership is that those objectives and interests which are 'competitive' in nature, are still sought to be included in order to ensure mutual benefits and a vested interest to realize the project.

7.3 Analysis

7.3.1 Historical Project Development

Plans for the S21 project were first announced in the early 1990s. Later, on 18 April 1994 Stuttgart 21 was first presented to the public by the chairman of the German Railways, hereafter DB AG, Heinz Dürr. At the time there was already fierce opposition against the plans. The plans involved overhauling the rail infrastructure and station and redevelop approximately 100 ha of railway land. Stuttgart 21 represented a vision which DB AG started to promote soon after it was privatized in 1994. The vision was "*typically based on a core concept of transforming an aboveground terminal station into an underground through-station while at the same time better maximizing the real estate potential of the station area.*" (Novy & Peters, 2012, p.129). By the scheduled start time of autumn 2010, mass rallies, with as many as 100,000 demonstrators, were taking place against the project.

The primary aim of the S21 project was to extend the high-speed train track between Mannheim and Stuttgart to Ulm. Because Stuttgart is located in a narrow valley DB AG had initially favoured a new high-speed track along the Neckar valley that would have bypassed Stuttgart's city centre. The reason for opting to bypass Stuttgart was that the current terminal could only accommodate trains leaving the station in the same direction that they arrived (Novy & Peters, 2012), and this is considered inefficient. Officials at several levels including the state, region and the municipality deemed the bypassing of the Stuttgart terminal unacceptable and quickly discussed alternatives. This led to a proposal by Stuttgart-based transportation expert Gerhard Heimerl. The proposal maintained the role of the existing terminus as the region's main transportation node and suggested that the high-speed track should pass through the sides of Stuttgart's valley by means of newly

built tunnels (Novy & Peters, 2012). Eventually the idea to move all rail operations underground emerged and S21 was born.

This S21 project, it was argued, would not only resolve the existing bottleneck situations in Stuttgart but also connected Stuttgart's centre to the high-speed track. In addition the realization of S21 would also make it possible to link the city's airport and its newly built trade fair to the high-speed track network and use large areas of surplus rail land above-ground for urban and economic development. In 1996 DB AG went public and presented a document entitled 'The Synergy Concept' providing evidence for the technical feasibility of the plan and economically profits that would be returned from investments of the plan (Bahnprojekt, 2012). It was argued that revenues would be generated from real estate development, rail transport increases, and reduced operation costs, thereby covering a substantial share of the projected investments.

In 1997 a period of intensive plan-making for S21 finally ended with the completion of the so-called Raumordnungsverfahren (ROV). The ROV is a mandatory procedure in German national planning law designed to assess the spatial implications of large-scale development projects and their incorporation into the wider regional and national spatial and transportation development plans (Bundesregierung, 2012). Soon after the release of the ROV report the planning and implementation process came to a halt. Concerns arose over miscalculations of similar large-scale projects combined with sluggish real estate sales cast, and this casted doubt on previous cost-benefit calculations.

In order to prevent the collapse of the S21 project the state, the regional government, and the city took decisive action because of the importance of the project to them. In 2001 the city bought roughly 90 ha of station-adjacent real estate – which DB AG had been unable to sell until then – at an above market price of €459 million (Novy & Peters, 2012). At the same time the state offered DB AG a package of long-term allowances for regional rail operations (Ibid, 2012).

After a bargaining process with the project partners to remove all further concerns, a renewed commitment to the project was formalized in July 2007 in a memorandum of understanding between DB, the federal and state governments, Stuttgart's city council and the Stuttgart Regional Council. In February 2010 almost 10 years later than originally planned, the partners and several dignitaries ceremonially marked the start of construction. However, on the first day demolition work began, about 20,000 demonstrators formed a human chain around a building on the project site before marching on to Stuttgart's city hall. This was but one prominent public indication of the considerable scepticism and outright opposition confronting the project.

7.3.2 Actor features

- The European Union – The EU is seen as a 'crowd' within the context of this project. It has some power and some interest in the realization of the project, which is expected to lead to socio-economic and environmental changes on a scope beyond the regional politics.
- BUND - The BUND is expected to invest 30% of the final costs into the project. With such a large investment in the project it is identified as a 'player', displaying both power and interest in the project.
- The state of Baden-Württemberg – The state of Baden-Württemberg is a public authority which is also considered a 'player' in the scheme of the project. Its funding of 20% of the project costs is sufficient to provide it with a considerable voice in the project development. Its overall interest is also determined through its position as the state whose aim it is to ensure socio-economic and environmental development.
- The Germany Railway (DB AG) – DB is a clear 'player' as it is the project owner. It is expected to contribute 36% of the final project costs. Its interest is very high because the project involves large infrastructural displacements of the infrastructure that it owns. Similarly its power is therefore also very high.
- The City of Stuttgart – The city of Stuttgart is considered as a 'subject' in this project. It has a high interest in the project because it directly affects the city's wellbeing. However its power in decision-making is considerably less. The reason being that it is only expected to cover 6% of the total investment costs.
- The Stuttgart Region –The Stuttgart Region is identified as a 'context-setter'. Again, the region is not expected to cover the high investment costs, but it does have considerable valuable knowledge of Stuttgart city and its overall position in relation to a larger physical area. It thus has power to instigate changes, yet little interest to make exceptional changes to the already agreed-upon project.

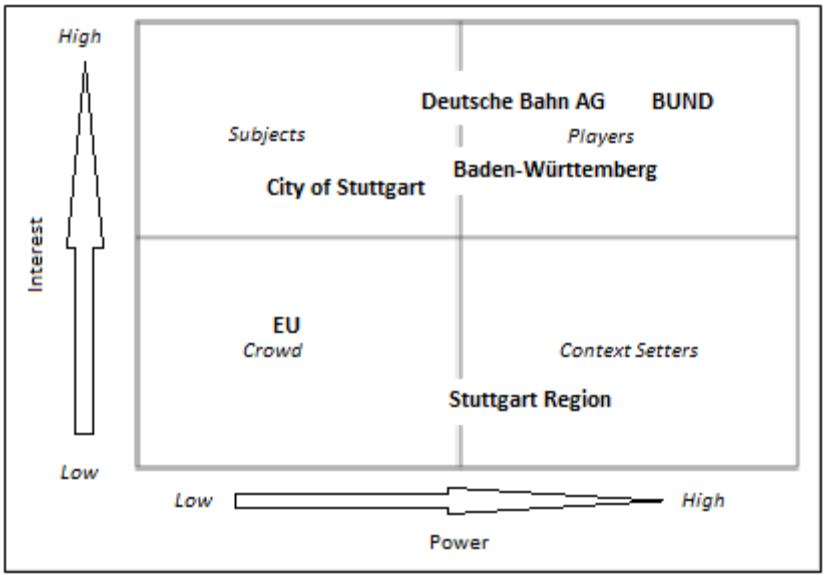


Figure 7.3-1: S21 Power-Interest grid

7.3.2.1 Summary

The main actors in the S21 partnership have been depicted in a power-interest grid. Their position has been based on information gathered during interviews and key mission statements found on their respective websites. By depicting the partners on such a grid it is possible to hypothesize about the likelihood of the project development to take a certain route towards various goals. Given that there are three actors listed as 'player' in this project it is likely to see the project evolve taking large considerations for their goals and ambitions over the other partners. Having said this the Stuttgart region could still influence further project developments, while the City of Stuttgart and the EU could serve to balance out some of the goals, or rather introduce others which must be included. This in turn is expected to render more likelihood to achieve sustainable outcomes as usually objectives are sought to be met for all parties in favour of making concessions of each other's objectives.

Variables	Description
Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof	Actors: • The actors consist of only public actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate about the project. Interaction: • There are three partners in charge to create an identity about soil and communicate the importance of them.

Table 15: S21 Actor Integration features

7.3.3 Institutional features

7.3.3.1 Contextual Environmental Policy Background:

All significant factors affecting soil were compiled and evaluated for the first time in the German Federal Government Soil Protection Strategy of 1985, in the Bundestag's tenth legislative period (Bundestags-Drucksache 10/2977) (BMU, 2002). The Government concluded at the time that not enough had been done in the past to protect the soil as a basis of all life (Ibid, 2002). The Federal Soil Protection Act, the last provisions of which entered into force on 1 March 1999, and the Federal Soil Protection and Contaminated Sites Ordinance, in force since 17 July 1999, replaced the generally formulated soil protection provisions found in various earlier items of sectoral legislation with a body of law specifically concerned with soil protection.

In Germany, there is a range of policy measures available addressing the protection of soils, including European, federal and regional legislation, as well as political programmes and incentive schemes. In the scope of an EU-study, Gay et al. (2009) assessed that there are 43 soil protection policies in Germany. In comparison to other member states this amount is rather high. The argument is made though that due to federalism, policy implementation and enforcement takes primarily place at the level of the individual states (Länder) (Prager et al. 2011b in Schill, 2011) resulting in the numerous amount of protection policies.

The German Federal Soil Protection Act is the only policy measure that directly targets soil conservation. It is a formal rule at the national level that has primarily been designed to address soil contamination issues related to closed dump sites and industrial plants" (Prager et al. 2011b, p117 in Schill, 2011). The Federal Soil Act and its associated Ordinance do not only provide a legal basis for soil conservation but also the evaluation and rehabilitation of contaminated sites. Non-compliance with the Act, for example, by taking actions that affect the soil in such a manner that harmful soil changes occur (Article 4), results in fines (Ibid, 2011). A key feature to the Act is the obligation to take precautions, which is stated in Article 7: "The property owner, the occupant over a site and the party who carries out, or has carried out by others, actions on a site that can lead to changes in soil characteristics are obligated to take precautions against the occurrence of harmful soil changes that could be caused by their uses of the site or in its area of influence.". By adopting the precautionary approach, the Ministry for Environment argues that legal certainty and investment security for owners and investors of land can be secured.

The Federal Soil Protection Act consists of 5 main parts (Vogel et al., 2004):

1) General Provisions
2) Principles and Obligations
    a) Obligations to Prevent Hazards
    b) Unsealing of Sealed Ground
    c) Application and Introduction of Materials on to or in to the Soil
    d) Obligation to take Precautions
    e) Values and Requirements
    f) Risk Assessment and Orders for Studies (Investigations)
3) Supplementary Provisions for Contaminated Sites
4) Good Agricultural Practice
5) Final Provisions

7.3.3.2 Stuttgart Soil Policy

The City of Stuttgart recognizes the need for functional soil protection concepts that lead to the conservation of the local soil resources and the fulfilment of legal requirements in environmental planning (Lexer et al., 2010, p.69). The Stuttgart Soil Protection Concept ["Bodenschutzkonzept Stuttgart (BOKS)"] enables one to document potential and actual soil losses with the help of a planning map for soil quality. BOKS is a logical and methodically simple concept with clearly defined objectives in order to raise acceptance and awareness (Lexer et al., 2010) and it became part of the regular planning process in the City of Stuttgart in March 2006. BOKS has developed a soil indication for Stuttgart which is based on quantity of soil and quality of soil (function). The soil indication is supported by a planning map which covers the entire Stuttgart city area, and consists of 6 levels (0-5) to characterize the quality of soils (Huber & Kurzweil, 2012, p.31).

The BOKS method incorporates two clear cut approaches for soil management. The first approach deals with inner urban development and concentrates on brownfield redevelopment. The second approach is termed 'degressive rationing' and relates to the first approach. It aims to minimize soil consumption such that

the soil demand by planning activities will be covered by inner urban development. The responsibility for the BOKS concept lies primarily with the municipality. The municipal council is responsible for planning decisions, while the municipal urban planning office is responsible for implementation. Finally the soil conservation authority is responsible for the data bases and the monitoring of success.

7.3.3.3 Summary

The partnership for the S21 redevelopment project is characterized by public actors. The initial analysis has determined three key 'players' in this partnership arrangement – DB, the BUND and The state of Baden-Württemberg. This represents half of the actors in the partnership. Of those three actors in the partnership, they all tend to operate with a national scope at mind. As such the project can be said to be steered through a top-down governance arrangement where the national and sub-national 'players' seemingly determine the project and its scope to which the other actors have to abide.

Interestingly the EU has been identified as a partner in this project. Its presence in the project clearly adds an international perspective to the project. The project is so large and complex that the effects, when completed, are expected to trickle down to other cities and countries within the EU. The inclusion of a context setter and a subject is also interesting and could result in the addition of opinionated actors that are able to take actions for other sustainable benefits. These other benefits could include alternative ideas with respect to soil management in the project area.

Variables	Description
Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • Some of the actors have goals for soil management(EU) while some more actively promote brownfield redevelopment. Power: • Leadership is displayed by three main players. Out of those, DB coordinates the project showing leadership functions. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory. The use of BOKS represents a new way to ensure soil management. • Communication tools for soils are still being developed. There is recognition of the interrelatedness between soil and groundwater.

Table 16: S21 Institutional Integration features

7.3.4 Policy-Content features

The project, similar to the other cases studies in this report, reflects the idea of compact urban planning with the construction of underground infrastructure. The compact city design has prevailed in larger urban areas in Europe over the years, and as such this project is not significantly different from other large urban city developments. The main idea through the use of this particular city design concept is to prevent the loss of valuable 'good' soils by preventing urban sprawl.

The scientific base for urban development on soils is provided by BOKS. BOKS is an addition to the mandatory policies on soil management which require actors to perform certain soil studies during the sale, transfer or development of land.

The policy-making procedure through BOKS reflects a flexible approach to decision-making guided primarily by legislation, permits, norms and standards. For soil management purposes the role of the BOKS concept is therefore of significant influence. However, it is interesting to note that BOKS concept finds itself guided by the public sector. The public sector thus plays an overwhelming role in this project and could be a factor in limiting confrontation from the project partners with each other to support a greater number of sustainable alternatives for soil management.

Having said this, up to 60 different alternative concepts were examined. Finally the subterraneous alternative was chosen as the best by the politicians. Those in favour of the project claim that new train station, being subterraneous, would free 100ha of space used by the old track system and would thus make the city greener. Despite the benefits the project, especially during the historical development was riddled with criticisms. The main points of criticism can be divided into five broad, interwoven categories (Novy & Peters, 2012):

- Cost and Economic Viability Issues
- Transportation Benefits and Impacts
- Environmental Costs/Ecological Risks
- Historic Preservation/Urban Development
- Decision-Making/Process/Participation

7.3.4.1 Summary

The study of policy content features offers an interesting perspective on the S21 redevelopment project. There are many top-down elements in the redevelopment approach of the station area. The observed procedures as described earlier have resulted in the development of a project that promotes the national goals of the region over the local ones.

The procedures followed through the application of the BOKS concept during this specific project shed light on the use of a more technical stance towards the environment over a normative one that could recognize different qualities that are not included in the indicators used; the qualities of the environment are listed in a set of indicators used which are embedded in legislation and the concept. Having said this, the procedures point to the importance of planning a project and taking sufficient time to analyze impacts of different land-use changes. Also the procedures of engaging beyond an area-based development towards a regional development strategy and even international by including actors that offer different resources was also considered important to ameliorate the soil sustainability in the project area.

Variables	Description
Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes, and the impacts of those changes on soil (BOKS). • The time between project initiation and project construction was 16 years. Planning a project is a crucial step yet this may be considered too long, leading to polarization of sides for and against project. Knowledge: • Scientific information is used. In German legislation indicators are used to determine 'bad' and 'good' soils and understand soil potential and function. • Advisory committees were not directly identified. The main partners aim to engage other actors throughout the project development. Resources: • Actor expertise is limited to the public sector. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources but has extended this beyond the region through considering the national scale and international scale. In this way the functions of soils and its values are shaped by a larger pool of knowledge. But the impacts do not remain local. • Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.

Table 17: S21 Policy-Content Integration features

7.4 Conclusion

The Stuttgart 21 project was advocated by the German transport authorities, politicians and favouring engineers who devised this infrastructural project. It can be seen that the idea was developed with an intellectual and factual approach with normative conservation goals. It therefore represents a clear-cut example of a top to bottom decision-making philosophy, where the role for the public was accepted after the creation of the plans. Governmental agencies tried to minimize public participation leading to a strong polarization of the sides in favour and against the project as some authors such as Novy & Peters (2012) write about. The governance mode in this project as a whole therefore seems to be guided by strong centralized characteristics. The effect of this is that integration of policies and goals, although present, is confined to primarily serve national interests.

Lessons can be drawn from the historical project development. First it is recognized that the project required more agreements on participation and administrative issues. The project was for some time criticized, and to this day still is, for not being on budget and for neglecting a sufficiently wide array of public concerns. Ensuring that these issues are dealt with in the planning stage is recognized as very important. Also evident is that the technical and judicial implications of a redevelopment plan such as proposed by the S21 project partners require expertise from a mix of angles. Partnering is thus an essential step in this redevelopment project.

The study of governance provides an interesting insight into the S21 project development as a whole compared to other angles of study. It indicates integrative efforts for and during the project development. Although somewhat subjective this conclusion is based on the fact that the main partners involved in the project have collaborated to find common grounds and ensure benefits for each other for engaging in the project. Variables covering time, resources, environmental policy and knowledge have been considered. Especially in the fields of knowledge and environmental policy the application of BOKS principles applied in the project development ensures important soil considerations.

In the long-term it is expected that soil quality in the project area will not be significantly affected by current developments, rather some improvements are expected. The project contributes to redeveloping brownfields and adding green areas to the city through the implementation of a technical approach; i.e. building tunnels. In terms of resources it is apparent that the socio-economic gains for sharing environmental responsibility within a partnership setting are expected to increase and be shared by the partners, as well as by the public living in the suburban region of Stuttgart.

The environmental policy which uses BOKS principles is based on using a larger scale, reflecting an ecosystems approach to management. The result being that the functions of the soils in the project area are shaped by a larger pool of knowledge. It has been observed that these principles attempt to disseminate the existing knowledge of soils across a broader audience, yet the procedures for doing so offer room for improvement. This is evident when examining the public nature of the partners, which is similar to the other case studies analyzed in this research, and acts as a restriction to information sharing. While the aim is to engage with more actors throughout the later project development stages when the tunnels have been completed as well as green areas, these actors are likely to be affected by a lack of holistic knowledge about the project area from the beginning stages.

In terms of institutional features the project is integrated well because there are objectives for soils which have been refined for regional implementation. Leadership to tackle soil issues is present which is necessary in project developments which want to overcome negative environmental issues. Lastly, rules and regulations have pointed to some diffusion of tasks, which allows for the other partners involved in the project to mainstream their concerns on the issues at hand, but as mentioned the public nature of the partners could act in a negative way as the organizations are similarly funded and organized. The result being that the involved organizations may be less willing to confront each other on certain negative issues.

7.5 Discussion

7.5.1 Success factors of integrated approach

Much of the planning and approval process of Stuttgart 21 resembles a textbook example of the combination of top-down and technocratic policymaking and “growth machine politics” promoting economic and social welfare, frequently associated with large-scale development projects. Following such a process critics have raised concerns about accountability, transparency, as well as the overall democratic legitimacy of the project (Novy & Peters, 2012). They argue that the legislatures, as well as the general public, had been misled about the pros and cons during the decision-making process. Furthermore DB AG’s status, effectively acting as a private but still state-owned and quasi-monopolistic railway operator is a key source of conflict and controversy.

None the less several factors found in this case study have resulted in an integrated approach which has helped to realize a sustainable soil management during urban redevelopment. These key factors are the use of a long-term time perspective which involved overseeing the effects of the project for the end-users and required sufficient gathering of relevant scientific information, and the formalization of a partnership between public spheres. This impacted the accountability mechanisms for each partners’ use of soil or exploitation of it and the cost and benefits for pursuing with the development of the project.

First of all time has been an important factor in realizing the current results of sustainable soil management. The planning process started in 1994 and continued until 2010 when a master plan was finalized and project construction started. Finalizing the initial plans thus took 16 years. The benefits of taking sufficient time to plan the final project are diverse similar to the other case studies examined. Taking sufficient time allows for data to be collected about the state of soils in the inner city area as well as the project area. It allows for development plans to assess the risks of certain land uses in relation to soil use and function. The time aspect also allows for an improved stakeholder analysis to be carried out. In the early stages of project initiation only two main

stakeholders were involved (Deutsche Bahn and The state of Baden-Württemberg), but more stakeholders became involved during the development of the initiation. This meant important agenda points and objectives for inner city redevelopment could be better established and coordinated taking on board more goals and objectives. Additionally these could be better synchronized with the total scientific data available for the area.

Horizontal integration efforts have taken place between the public organizations. A mix of 6 partners from the public sphere took part in the project development. The public focus involves advantages and disadvantages. The advantages come in the form of facilitating administrative agreements which is considered an important part of an integrated approach. Clear roles are needed during project development to prevent overlapping and enhance the project efficiency and it is likely this is facilitated through the public nature of the partnership.

Partnering with each other also contributed to creating an understanding of different interests for redeveloping the inner city area shifting the focus of redevelopment away from sector-bound goals towards regional and even national goals. The inclusion of more interests and goals also led to a shift from the consideration of just a single development phase and single construction, to the consideration of the entire development process from 'initiative' to 'management' and the consideration of a larger spatial development. Furthermore the partnership also contributed positively to the sharing of knowledge which led to the acknowledgement of costs and benefits related to up-scaling the project area.

By focusing on regional and national goals rather than sector specific goals, and by considering the development cycle in its entirety, the scope of the project has increased. This resulted in soil pollution and the involved risks being examined from a different perspective. The risk calculations of soil pollution over a larger area and over a greater time frame allowed for the goals and interests of the partners to be adjusted. In turn this affected the cost and benefit calculations of the partners.

It can be concluded that integrative urban processes have taken place throughout the project. The public partnership which involves the government at several levels has legitimized the project and also contributed to the interest in soil management because of the publics' duty to assure the wellbeing of its citizens. The public influence of the project has also helped to facilitate administrative agreements more easily including establishing the objective of clean soils in the inner city. The use of a partnership between the public agencies has resulted in expanding the development area, recalculating risks, re-evaluating costs and benefits and broadening the value concepts of clean soils. These factors have played an important part in the sustainable redevelopment of the inner city district.

7.5.2 Improvements for integrated approach

The partners involved are mostly public agencies, although some may be considered quasi-public-private organizations. The public-based partnership has several implications for the project. These implications come in the form of limiting the broader horizon of the project such that all contaminants in the soil are fully dealt with. While the above argued that the partnership contributed positively to the project, the public focus also brings recognizable limits with it. The lack of private organizations in the internal partnership limits the amount of soil considerations and thus results in the project as a whole overlooking the broader interactions with soil.

Measures used to ensure soil policy integration provide possible insights. Although the use of knowledge is stimulated by applying BOKS principles the lack of private signatories in the internal partnership poses limits on the existing rules and regulations for soil quality.

Several measures are expected to contribute to more integration which would lead to improvements in sustainable soil management:

- Involvement of private organizations
- Enlargement of project area to include a greater land-use mix
- Increased communication about soils
- Consultation and participation forums about soils

Chapter 8: Case Study – Lyon Confluence

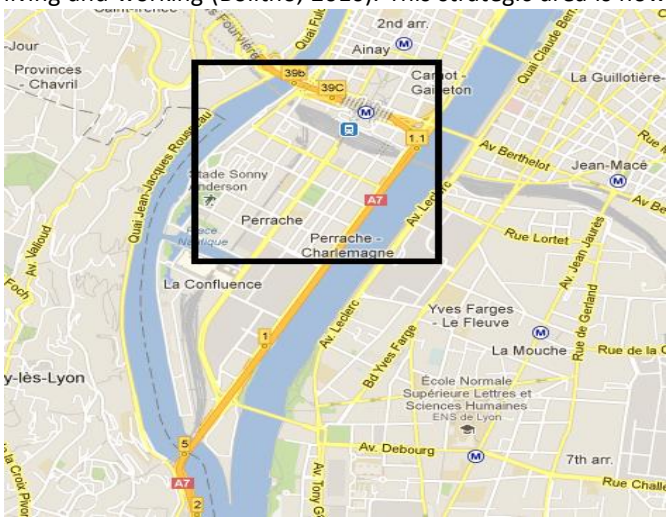
Important questions answered in the case studies are the following:

- **What ambition do governments have for soil management at the local /regional level**
- **What measures and instruments can be identified with regards to sustainable soil management**
- **How are governments at the local/regional level striving for integration**
- **What results were achieved**
- **How was the process organized and executed**
- **What is the applied mode of governance**

8.1 Project Background Information

Lyon is the second largest city in France. It is situated in the east of France, relatively close to the borders of Italy and Switzerland. The station redevelopment project itself is located at the confluence of the Rhône and the Saône rivers. This finds itself right in the heart of Lyon, on the Perrache peninsula, which was dedicated to industrial and transport activities. It is now the place of one of the most ambitious urban development projects in France and in Europe. The planned developments are expected to double the size of the historic center (Bolitho, 2010).

Well aware of the area's role for the city's future, Lyon's Town Council and Urban Planning have made its rehabilitation a priority. In 1998 talks began about redefining the industrial quarter to an attractive place for living and working (Bolitho, 2010). This strategic area is now being prepared for a new function which is more appropriate due to its central and pivotal location. The rehabilitation phase of the southern part of Perrache peninsula officially started in 1999. The Lyon Confluence project will offer all key elements of a town centre: offices, apartments, businesses, cultural and leisure centres. Public areas, parks, gardens and green belts will cover about a third of the whole project area (150 ha) (Ademe, 2012).



A specific organization on behalf of the Greater Lyon region, SEM Lyon Confluence, has been created for the project execution and management (Ademe, 2012). The company's main functions are the management of project design studies, the definition of the project execution methods, management of ownership, execution of demolition, construction and rehabilitation works and promotion of the site and project.

Part of the redevelopment process will aim to improve public transport and related facilities (Ademe, 2012). The tramline for example will be extended to link up with the metro, and new bridges are planned to be built. Also a multi-story parking garage is planned which will offer space for more than 1000 cars. It is expected that by 2030, 25 000 inhabitants will live in the project area, 14000 employments should be created by new leisure and cultural infrastructures and a large green space should be reserved (30-40 ha).

Important details of the plan are summarized in the table below:

Lyon-Confluence	
Total (expected) Investment costs	1.16 billion
Start year initiation of project	1999
Start year construction	2003
Estimated completion	2030
Urban redevelopment	150 ha
Population of metropolitan Lyon	467,000 (approx.)
Partners	• WWF • Greater Lyon • SPLA (local public redevelopment company) • (Nedo, since 2011)

8.1.1 Actor description

The plan that was initiated in 1999 includes 3 main partners as listed on the official public website [www.lyon-confluence.fr]:

- Greater Lyon Area - As the capital-city of the Rhone-Alps Region, which is at the peak of sustainable energy development in France, the Greater-Lyon demonstrates through its direct participation in this project its will to make environment-friendly urban and building design a major axis of its commitment toward sustainable development.
- SPLA - This local public/private limited company has been established in 1999 on the joint initiative of the City of Lyon and of the Greater Lyon Council, in partnership with public and private stakeholders interested in the development project of the Confluence. The shareholding gathers public and private operators recognized for their know-how and their skills in financial engineering of urban development.
- WWF – The World Wide Fund for Nature is a NGO which endorses the project due to the innovative partnerships the project has formed to promote sustainable development. Particular in the field of energy efficiency.

In 2011 a new organization entered the partnership; Japan's New Energy and Industrial Technology Development Organization (Nedo) (lyon-confluence, 2012).

- Nedo- the Japanese equivalent of the ADEME which is the French Environment and Energy Management Agency. Nedo is thus a Japanese public agency that promotes research and development as well as the dissemination of energy, environmental and industrial technologies.

8.2 Project Innovations

One of the main reasons why the project took off was due to the determination of the regional Council and the French Environment and Energy Management Agency (ADEME) to be part of a "programme of investment in the future". One of the main innovations is that the "Lyon confluence" developer SEM has set up different various partnerships with a mix of stakeholders which can be grouped in three distinct organizations (Lyon-confluence, 2012):

- with the railway company: Improvements on disturbance and pollution reduction, integration of trains as an urban transport facility etc.
- with energy companies: Improvements on pollution reduction, implementation of new technologies etc.
- with a company in charge of rivers management: Improvements on riverbank management and conservation etc.

In setting up these other partnerships the goal of the project as a whole focuses on introducing eco-construction which combines high environmental quality and the use of renewable energies. The promotion of an innovative district development is carried out by RENAISSANCE in this project. This organization acts as a research institution to observe the energy efficiency and the ratio of renewable energy for the new developments.

At present the Lyon Confluence has already been listed as an eco-neighborhood by the French Ministry of Ecology and Sustainable Development and is now the first neighborhood in France to be officially recognized by the international conservation organization, the World Wide Fund for Nature (Bianchini, 2012). The results of the recognizable sustainability in the urban development process have led to different sources of funding, such as through the EU CONCERTO program (Ademe, 2012; Concerto.eu, 2012). The CONCERTO initiative includes a diversity of applications of renewable energy sources and energy efficiency measures in buildings (Concerto.eu, 2012).

In terms of soil management the project is expected to contain approximately 35 hectares of green spaces (lyon-confluence.fr, 2012). Although parks do not necessarily suggest fully appropriate soil management practices, they do help to determine a soil quality which has to be met. These soil qualities must be of such a standard that people are not affected health-wise, and the flora consisting of over 3000 plants of local species (lyon-confluence, 2012), will be able to thrive. Additionally, the soil quality standard must be such that it also attracts birds and wildlife.

8.3 Analysis

8.3.1 Historical Project Development

In the first decades of the 20th century Lyon was the field of pioneering urban-planning ideas of Tony Garnier, supported by Édouard Herriot, the mayor of Lyon from 1905 to 1957. In spite of many plans considering the Confluence from several architects and urban-designers, the ideas of a modern city were only implemented in other districts of Lyon such as Gerland or Les États Unis. Garnier had two projects for the Confluence including a war memorial in 1920 and a cinema in 1924, however both of them stayed hypothetical. Although Herriot later created a Municipal Commission for the Study of the Plan to Extend and Improve the City of Lyon that came up with plans to use confluence peninsula area, none of those were ever realised either.

The debate on the role of the Confluence was reopened by the Compagnie nationale du Rhône (CNR – National Rhône Company) in 1979. It announced a competition for the redevelopment of the Rhône from Lyon to the sea. Although the competition received attention, the first prize development concept which was won by Alain Dufau, was never carried out. Between 1983-84 René Gagés, architect of the Transit centre proposed a project "The Lyon Confluence, an International Metropolis", stressing the intercultural values of Lyon and suggesting ways to redefine the Confluence. This led to a cooperative project with an American organisation "Partners for Livable Communities" from Washington. The cooperative venture was titled "Partners-Europe", and contributed proposals for urban renewal. The experiences learnt from the cooperation were developed such that they could also be used in the United States (Lyon Confluence, 1998). None of the projects however were called for by the local government of Lyon.

Finally, in April 1997 Greater Lyon Community Council invited agencies to develop "Perrache-Confluence" to be the new city centre. The strategic location of the Confluence at this time was realized as well as the need to update out-dated infrastructure for the growing population.

In 2001 the newly elected municipality had a strong political impetus toward sustainability as a major axis of the project. As a result there is now a comprehensive approach to sustainability including ground de-pollution, transport re-organisation, waste management, water conservation and sustainable energy. In 2003 at the start of project construction, an environmental study was carried out by a specialised engineering office in order to analyse environmental options of the project development. This study concluded that energy efficiency and the use of renewable energy sources were the main weaknesses of the area which ought to be addressed in the project.

8.3.2 Actor features

- WWF – The WWF is identified as a 'subject' in the redevelopment project. It recently entered the official partnership in support of the ongoing initiatives. Its power is low because it does not have the financial capacities to determine how the project unfolds due to its NGO status. But its interest is high because of the resources they have available in terms of environmental knowledge and the willingness to share this.
- Greater Lyon – The Greater Lyon council has been identified as a 'player'. Although its main priorities do not necessarily connect to soil, its overall goal is to stimulate the sustainable development of the Confluence project area. It has the power and interest to steer and realize the project because it is the party directly responsible for the area.

- SPLA – SPLA is seen as a 'player' because of its direct relationship to the Greater Lyon council who created the SPLA. The difference is that the SPLA is in charge of contracting out the development to various other players.

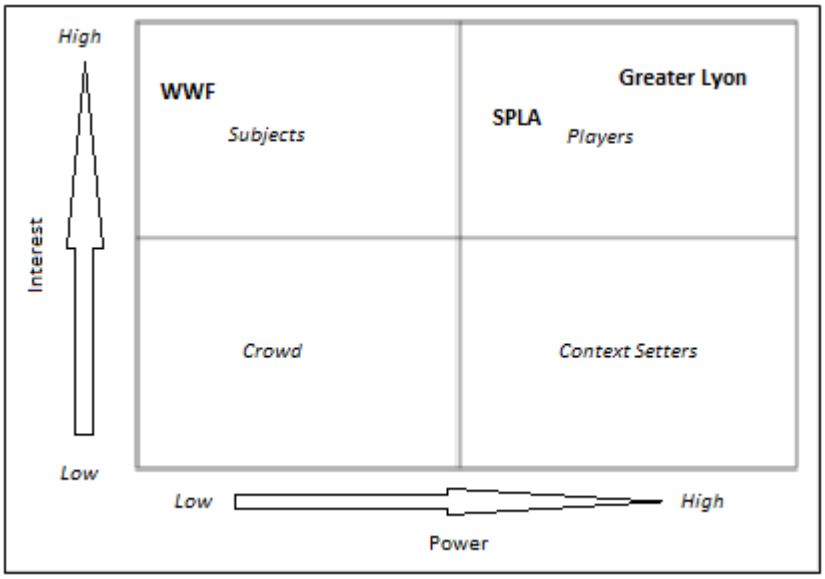


Figure 8.3-1: Power-Interest grid Lyon-Confluence

8.3.2.1 Summary

The main actors in the Confluence partnership have been depicted in a power-interest grid. Their position has been based on information gathered during interviews and key mission statements found on their respective websites as well as the brief history of the project development. Out of the three actors two are seen as 'players'. Both of them operate in the public sphere. The WWF is an NGO party that acts in the interest of the public. Nedo, the Japanese public agency for energy research and development, which is not depicted in the grid, would be depicted in the same category as the WWF. The reason being that it has less political power to make drastic changes to the current development, but has high interest in being part of the development.

Variables	Description
Actor variables: • Looking at actor type (public, private), • Looking at actor configuration (partnership type) Interaction variables: • Looking at the methods in place to communicate and create an identity about soil and benefits thereof	Actors: • The main actors consist of public actors and an NGO. The NGO acts in the interest of the public • The public nature of the main project partners represents a top-down form of rule. Interaction: • Soil is not directly communicated per say. But the holistic sustainable approach, especially energy and building sustainability, has been widely advocated. The project is recognized and funded by the EU CONCERTO.

Table 18: Lyon-Confluence Actor Integration features

8.3.3 Institutional features

8.3.3.1 Contextual Environmental Policy Background:

The absence of a comprehensive soil protection system in France has resulted, since the 1990s, in public authorities forming their own soil protection policies, developing not only management and monitoring tools but also liability guidelines and enforcement actions, without any clear supporting legal framework (NICOLE, 2005). At the same time, the largely uncoordinated legislative developments, which often derive from EU law, in various sector specific regulations (for example the industrial, waste, water and mining law regimes) have introduced explicit and/or implicit concurrent and sometimes conflicting legal basis that could be used by public authorities to tackle soil issues (JEEPL, 2006).

Over the last 15 years, this incoherent development of a soft law soil protection system has led to (i) the development of recognised soil contamination management tools (e.g. identification of orphan sites, development of pollution registers, development of a risk assessment approach to soil decontamination), but also (ii) a disastrous set of conflicting court decisions considering the definition of the person liable and the level of remediation, resulting in discrimination, legal uncertainty and (sometimes) unfair decisions. It was only in late 2004 and 2005 that the liability regime for former industrial sites was eventually settled by the French Administrative Supreme Court (Conseil d'Etat), and the Government put in place a legal framework for a new site closure regime, which included, to a certain extent, a definition of the level of remediation.

8.3.3.2 Contaminated site management in France:

The Ministry for Environment initiated its soil contamination and remediation policy in 1993 with a circular addressed to all local environmental authorities (Préfet) setting out the National soil remediation and clean-up policy (NICOLE, 2005). This circular was subsequently supplemented by two further circulars issued in 1996 and 1999 (Ibid, 2005).

A number of inventories have been made on contaminated sites and soils in France since the 1970's (Ademe, 2011). On the one hand, an inventory of polluted sites calling for action by the authorities (BASOL) represents around 4,300 sites. On the other hand, an inventory of former industrial sites or service activities that could have polluted the land will eventually cover some 300,000 sites (BASIAS).

Initiated in 1993, Basol contains information on all contaminated sites identified by the environmental authorities including the interested parties, site location, type of contamination, actions taken by the authorities, the type and techniques of remediation and the remediation status. Any new contamination identified is entered into the Basol database, including those identified from the surveys undertaken by the authorities since 1996 on existing industrial sites. As of August 2005, Basol listed 3,717 sites as contaminated or potentially contaminated.

Initiated in 1993, Basias is designed to keep track of past industrial activities which information may then be used in particular in the context of proposed development. It contains information on former industrial and pollution-related sites, gathered from existing archives and regional historic inventories commissioned for that purpose.

The French authorities have a site-specific pragmatic approach to soil and groundwater contamination. This means that, for each site, a risk assessment (which includes the potential impacts for human beings, water resources and, to a lesser extent, flora and fauna) is performed based on the precise identification of contamination sources, pathways and receptors, and in consideration of the proposed future use of the site. There is therefore no legal or regulatory definition of what is contamination and no legal or regulatory value limits for contaminants in soil or groundwater. The policy focuses on removing the risk of contamination rather than the contamination itself, it may be seen as leaving many sites with residual contamination, preventing potential future re-development and not addressing comprehensively damage to the environment per se.

The financing of the remediation operations differs depending on whether the authority could identify a liable person or not. Where a solvent person is identified as being liable, that person will be responsible for the remediation costs. A very limited number of subsidies from different public agencies or authorities are available however, these are highly unlikely to cover the full cost of the remediation. Potential subsidies include:

- Regional Authorities and the French Environment Agency, ADEME, may take responsibility for part of the costs incurred for the identification of the contamination (technical audits).
- Water Agencies may decide to take responsibility for part of the costs or grant loans for the remediation of surface water or groundwater resources.

Orphan sites are remediated by the French State through the French Environment Agency, ADEME. The French State can require the ADEME to carry out audits and remediation operations only where no liable solvent person could be identified. The Préfet is entitled to impose on the property owner a right of way over his property so as to allow the ADEME access to the property to carry out the remediation for a period of up to 20 years. In 2004, the ADEME was present at 55 different sites under this procedure (JEEPL, 2006).

8.3.3.3 Summary

Many studies have been carried out in order to gain a good knowledge of the area's environmental status and to control the environmental risks. Among the main studies carried out are the following (Artelia, 2012; Magelis, 2003; Ademe, 2012):

- Baseline study of the whole peninsula, in order to list all former and current industrial activities on site.
- Sub-soil investigations at about ten former industrial sites (La Poste, Colas, RFF-SNCF, etc.), in order to define and quantify potential soil and groundwater contaminations.
- Generic Health Risk Assessment study for the whole peninsula, in order to estimate the health risks due to chemical pollution once rehabilitation plans have been performed. INERIS and BRGM have made third party reviews of this study and validated results. The risk assessment study has then been applied and adapted to each former industrial site and to each future rehabilitation site (leisure marine, leisure centre, apartments, etc.).
- Technical study of environmental aspects for the making of a leisure marina in the centre of the peninsula (groundwater pumping tests, hydrology modelling, soil lixiviation tests, etc.).
- Demolition and rehabilitation management of the sites presenting risks for future users.
- Regular piezometric waterground survey on the peninsula ; water level surveys through a network of piezometers ; analysis of water quality for a number of them.
- Implementation of an environmental management system (EMS), including an "environment quality charter" for future construction sites.

As a whole, although the partnership is characterized by just 2 public actors and an NGO, much work has been outsourced in a decentralized manner to private parties. The sharing of tasks during the project initiating and planning phase has benefited from a considerable number of studies which resulted in the need for technical or strategic options to be worked out. Interestingly the project is recognized for its sustainability efforts, especially in the field of energy and buildings codes, and thus receives grants for the EU CONCERTO program. The international attention is not limited to the EU but even expands to Japan. Ademe has been active in the field of soil management for the project but its work is somewhat limited to providing recommendations. As the partnership is expanding that the sustainability problem is not worked out on a local level, rather on a global scope. Given that local public agencies are in charge though it is not expected that the local sustainability issues will be overlooked.

Variables	Description
Objective variables: • Examining overall project goals • Examining the goals of actors for soil management Power variables: • Identification of power and interest in project through assessment of leadership and coordination mechanisms Rules and Regulation variables: • Examination of dialogue (top down or bottom up) • Examination of reporting about soil • Examination of communication tools	Objectives: • Soil management goals are refined from national standards to promote regional implementation. • Not all the actors have direct goals for soil management, but to stay a front runner in sustainability it must be considered. Power: • Leadership is shown by public agencies representing the greater Lyon council – SPLA, and SEM Lyon Rules and Regulations: • A top-down dialogue with decentralization of tasks in a bottom-up manner as well as networked globally. • Soil reports are mandatory and are done through Ademe • Communication tools about soil exist (Basol & Basias). These recognize relationships with other activities. Communication to the wider public could be improved.

Table 19: Lyon-Confluence Institutional Integration features

8.3.4 Policy-Content features

The project aims to revitalize an area formerly consisting of industrial infrastructure. In doing so the project makes use of the inner city and brownfield redevelopment concept. It also aims to improve accessibility through revamping the station, extending a tram track and building additional bridges to the peninsula.

The main scientific basis for the project is provided by externally contracted actors consisting of a mix of public and private actors, both local/regional and international. Given this extent of participation in the project the potential knowledge base to be used and developed is extensive. However the decision-making procedure restricts itself to a hierarchal top-down procedure through the Lyon public authorities.

Although Ademe is active in the field of soil management it seems to derive its own limits of site contamination, and as described in the institutional setup the focus lies on removing the risk of contamination rather than the contamination itself.

8.3.4.1 Summary

The study of policy content features offers an interesting perspective on the Lyon redevelopment project. There are many top-down elements in the redevelopment approach of the station area. The observed procedures as described earlier have resulted in the development of a project that promotes the national goals of the region, but through external contracting also assumes the importance of the local issues.

The procedures followed through during this specific project shed light on the use of a more technical stance towards the environment over a normative one that could recognize different qualities that are not included in the indicators used. Not only are the qualities of the environment that is desired listed in a set of indicators which are embedded in legislation and the concept, but also the technical approach is seen through the application of energy and building efficiency targets adopted for this project.

Having said this, the procedures point to the importance of planning a project and taking sufficient time to analyze impacts of different land-use changes. Also the procedures of engaging beyond an area-based development towards a regional development strategy and even international by including actors that offer different resources was also considered important to ameliorate the soil sustainability in the project area.

Variables	Description
Time variables: • Examination of project for future plans • Examination of time between project initiation and project construction Knowledge variables: • The use of science about soil studied • the use of advisory committees Resource variables: • Examination of actor expertise according to field of interest • Examination of application of tools (EIA, SEIA, Indicators) used in project area Environmental Policy variables: • Examining the necessity of the project to consider soil resources its functions and values (behaviors) • Examining the internalization of externalities	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes, and the impacts of those changes on soil. • The time between project initiation and project construction was 4 years. It is acknowledged that the planning phase of a project is a crucial step. Knowledge: • Scientific information is considered important. In French legislation progress has been made to determine 'bad' and 'good' soils and understand soil potential and function. This is partly done through Ademe and its partner organizations. • Advisory committees constitute external actors to the project. In this case there are many externally contracted actors identified as key advice organizations. They offer key suggestions for the development of the project. Resources: • Actor expertise is unlimited but with a key focus on the energy sectors. The actors rely on networking internationally to show off the impact of the project development and obtain important grants. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources by considering the regional scale of the peninsula. The functions of soils and its values are shaped by the objectives of the peninsula. • Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.

Table 20: Lyon-Confluence Policy-Content Integration features

8.4 Conclusion

The Lyon Confluence project has been encouraged both by transport authorities and politicians who recognized the importance of renewing infrastructure to encourage the regions' socio-economic capacities to grow. It can thus be seen that the idea was developed with a factual attitude which includes normative environmental goals that promote various facets of sustainability. It therefore represents a top to bottom decision-making philosophy. The effect of this is that integration of policies and goals, although present, is confined to primarily serve national interests.

Lessons can be drawn from the historical project development. First it is recognized that the project required agreements on the main sustainability issues which were obtained through a SWOT (strengths, weaknesses, opportunities and threats) analysis. Ensuring that these issues are identified and dealt with in the planning stage is recognized as very important. Also evident is that the technical and judicial implications of a redevelopment plan such as proposed by the Lyon-Confluence partners require expertise from a mix of angles. Partnering is thus an essential step in this redevelopment project.

The study of governance provides an interesting insight into the Lyon-Confluence project development as a whole compared to other angles of study. It indicates integrative efforts for and during the project development. Although somewhat subjective this conclusion is based on the fact that the main partners involved in the project have collaborated to find common grounds and ensure benefits for each other for engaging in the project. Variables covering time, resources, environmental policy and knowledge have been considered. Especially in the fields of knowledge and environmental policy the application of energy efficiency principles applied in the project development have led to an enhanced state of sustainability.

Soil quality in the project area will not be significantly affected by current developments, rather some improvements are expected. The project contributes to redeveloping brownfields and adding green areas to the peninsula. The 'Place Nautique', which is an immense square, will be the biggest public space in the area. Half of its ten acres are taken up with a huge inner harbor, fed directly by the Saône. Because of the public nature of this square it is imperative for the soil and general environmental quality to be of adequate standard so as to avoid potential health risks by the users.

In terms of resources it is apparent that the socio-economic gains for sharing environmental responsibility within a partnership setting are expected to increase and be shared by the partners, as well as by the public living in the suburban region of Lyon-Confluence.

The environmental policy which relies on conforming to high European standards is based on using a larger scale, reflecting an ecosystems approach to management. The result of this is that the functions of the soils in the project area are shaped by a larger pool of knowledge. It is thought that these principles attempt to share the existing knowledge of soils across a broader audience. The public nature of the partners, which is similar to the other case studies analyzed in this research, can be seen to act as a restriction to information sharing. While more actors will be included throughout the later project development stages these actors are likely to be affected by a lack of holistic knowledge about the project area from the beginning stages.

In terms of institutional features the project is observed to be an integrated one. Objectives for soils, which have been refined for regional implementation, exist. Leadership to tackle soil issues is present which is necessary in project developments which want to overcome negative environmental issues and ensure public wellbeing. Lastly, rules and regulations have pointed to some diffusion of tasks, which allows for the other partners involved in the project to mainstream their concerns on the issues at hand.

8.5 Discussion

8.5.1 Success factors of integrated approach

Several factors found in this case study have resulted in an integrated approach which lead to more sustainable soil management during urban redevelopment. These key factors are a high level of political commitment to manage the integrated process, the use of a long-term time perspective which involves the monitoring of soil conditions with the use of standardized indicators adjusted through time, relevant scientific information from international organizations, and the formalization of a partnership between public spheres affecting the accountability mechanisms for each partners' use of soil and identification of sustainability issues.

High level political commitment can be said to indirectly affect the process of achieving an integrated approach with soil management because it legitimizes administrative agreements for urban redevelopment. The centralized government plans which involved revamping the Lyon-Confluence peninsula was indeed seen as a necessary development, partly recognized due to the governments' prior attempts at creating a discussion about improving the greater Lyon area.

Time has been an important factor in realizing the current results of sustainable soil management. The planning process started as early as the early 1900s and continued until the end of the century. In 1999 the project was finally initiated, and it wasn't until 2003 when a master plan was finally created and construction could start. The benefits of taking sufficient time to plan the final project are diverse as it also the case in the other case studies analyzed in this research. Taking sufficient time allows for sufficient data to be collected about the state of soils in the inner city area. Furthermore it allows for a thorough stakeholder analysis to be carried out, and important agenda points and objectives for inner city redevelopment to be made and synchronized with the scientific data collected.

The horizontal integration efforts that have taken place between the public do seem to offer room for improvements. A mix of 3 partners from the public and NGO sphere took part in the project development. A fourth partner was recently involved as well. Partnering with each other contributed to creating an understanding of different interests for redeveloping the inner city area shifting the focus of redevelopment away from sector-bound goals towards regional and even national goals. But the lack of a recognized private party in the immediate partnership seems to dismiss the inclusion of more interests and goals, especially at the local level. As a whole though the partnership has helped to shift the development focus from the consideration of just a single development phase, to the consideration of the entire development process from 'initiative' to 'management' in the long run. Perhaps most important to ensure this consideration however is the funding by the EU CONCERTO for which a long-term outlook is required.

By focusing on regional and national goals rather than sector specific goals, and by considering the development cycle in its entirety, the scope and impact of the project has been increased. This resulted in environmental issues such as pollution and the involved risks of those issues being examined from a different perspective. The risk calculations of soil pollution for example were made over a larger area and over a greater time frame, which allowed for the goals and interests of the partners to be adjusted. In turn this affected the cost and benefit calculations of the partners for the developments planned on the peninsula.

In summary it can be said that there are clearly integrative processes which have taken place in the project. The central government as a partner legitimized the interest in environmental soil management and helped to facilitate administrative agreements. The use of a partnership between the public sectors resulted in expanding the development area, recalculating risks, re-evaluating costs and benefits and broadening the value concepts including in part those related to soils. These factors have played an important part in the sustainable redevelopment of the inner city peninsula of Lyon.

8.5.2 Improvements for integrated approach

What is interesting is that the partners involved are mostly public agencies. The public-based partnership has several implications for the project. These implications come in the form of limiting the broader horizon of the project such that all contaminants in the soil are fully dealt with on the entire peninsula. While the SWOT analysis was used to identify environmental problems, and the above argued that the partnership contributed positively to the project, there are clearly limitations. First the SWOT analysis does not contribute to making holistic plans to deal with potential sustainability weaknesses. So, although problems are identified and knowledge thereof is shared, it is up to involved actors to come up with solutions. This brings to the table the public focus of the partnership which also has limits - there is a lack of fundamental democratic debate which is necessary to ensure a wider perspective on issues. The objectives for the project development, without full cooperation from private organizations on the peninsula, thus seems to create an environment of overlooked opportunities.

Overall the use of knowledge has been limited without the inclusion of the private sphere as a signatory party to the redevelopment. The rules and regulations for soil quality were also limited by the public scope and project-area scope which was considered in the final redevelopment plan. By limiting the project area and project scope, soil quality did not need to be strategically assessed for a greater mix of functional uses other than the already administratively agreed-upon top-down plans.

Several measures are expected to contribute to more integration which would lead to improvements in sustainable soil management:

- More societal backing for soil management
- More involvement by private parties
- Increased communication about soils
- Consultation and participation forums about soils

Chapter 9: Case Study Comparison

This research has made use of case studies to further develop the themes found in the literature and workshop. The case studies combine a historical analysis of redevelopment projects together with a multi-level governance assessment. The historical analysis helped to determine *how partnerships have developed* for each project and what *the underlying goal of redeveloping* was. The multi-level governance assessment helped to detail *actor arrangements* within the project partnerships and explain the *observed factors of integration and soil management*.

9.1 Introduction

The case studies offer an interesting perspective on the efforts to integrate soil management in urban development practices. By describing historical features of the redevelopment process and analyzing the governance features it is apparent that there are organizational, procedural and normative elements which need to be considered to promote the integration of soil sustainability.

This chapter will first describe key findings in each case study separately. This will be followed by a table which concludes the chapter. The table includes key descriptions of the variables found and identified for each case. It is thought that the similarities will help to mark 'best practice' examples, especially if they are found in multiple cases. Yet it is also important to consider key differences, as these may represent important shifts to overcome failed attempts of integrating soil management in urban development.

A comparative research such as this has the potential to add a body of knowledge to the literature. It provides the opportunity to examine patterns and changes to gain a profound insight into the way various processes take place, and the reason why they develop in one way instead of another (Verschuren & Doorewaard, 2010, p.159). The information gathered in the case studies made use of a mixture of methods, including an observation on location (Utecht, Stuttgart and Gent), and conducting interviews in combination with studying documents both political and apolitical in nature. Although the research may contain subjective elements, the systematic research approach applied adds objectivity to the study.

9.1.1 Utrecht

Important factors for integration were identified in this case study. These include a high level of political commitment to manage the integrated process, and the use of a long-term time perspective which involves the monitoring of soil conditions through time into the management phase of the new development. The time aspect also helped to allow for sufficient gathering of relevant scientific information, and the formalization of a partnership between public and private spheres which consequently affects the accountability mechanisms for each partners' use of soil in a positive manner.

In the past, prior to the Soil Quality Decree, the aims for the soil were pretty much defined by the national state government (NICOLE, 2005). Since the early 1980s, the nature of soil remediation business has changed into a professional sector. With the development of the Soil Quality Decree this professionalism has been acknowledged in that the main *responsibility for maintaining soil quality shifted from the national state government to the municipal authorities*. This trend is observed in the Utrecht case and is part of the reason for the development of a *partnership*. At the same time, the development and maintenance of technical guidelines are now primarily a responsibility of the *external professional organizations* (agentschap.nl, 2010). The publication of the Soil Quality Decree resulted in a drastic change in soil quality standards. The perspective of the new decree is different from the past as soil (re)use is now the prime objective (agentschap.nl, 2010).

The whole concept of sustainable land management for clean and slightly polluted soils is based on an *extensive knowledge* about the soil quality which is one of the main observed facts of integration. Dutch soil has already been investigated for three decades, not only at contaminated sites but also at uncontaminated sites. Theoretically, this implies that there is a huge amount of *soil data available* (VROM, 2010). All potential contaminated sites were identified in 2005. This resulted in a nationwide map that is publicly accessible through internet. It allows anyone, both the lay and professional public, to focus on a specific site in the Netherlands and obtain its contamination status. One can simply find out whether a site is suspected of soil contamination, is under investigation or has been remediated. More detailed information on the soil quality is contained in the Soil Quality Maps primarily produced and maintained by the municipal authorities. The main role of these Soil Quality Maps is to enable the reuse of soil without the need for analysis. As such, it

significantly reduces the costs associated with soil reuse and gains time as there is no need to wait for the results of analyses.

In this case study it seems that the *extensive knowledge* about soil qualities in the Utrecht central area has contributed to exercising a holistic development strategy. Various *fields of expertise* have worked together to design a plan that focuses on *conserving soil* as much as possible. In the literature this seems to be a parcel of sustainability for soil management. Due to the scarcity of the resource in the urban landscape, and the importance of it in the future, this strategy is often favored in the literature over exploitation, or even re-use, especially if it is not kept within the regional boundaries.

9.1.2 Gent

The most important factors found in this case study which have contributed to an integrated approach includes the use of a long-term time perspective which involved overseeing the effects of the project for the end-users and required sufficient gathering of relevant scientific information, and the formalization of a partnership between public spheres. Together it is was found that the factors impacted the accountability mechanisms for each partners' use of soil or exploitation of it, and the cost and benefits for pursuing with the development of the project.

The Gent case study of the Sint-Pieters station area redevelopment seems to reflect the least integration efforts from the start of the initiation and planning phases when reflected with the framework on integrated soil management derived by the literature and workshop. From the descriptive analysis it is noticeable that the project as a whole, initiated and planned through *a public partnership*, failed to sufficiently combine a greater number of interests in the project area. Consequently the *goals of the project have focused on higher level government ambitions at the national level* rather than the regional and local level at which the sustainability impact of projects is felt. The result of this is that the project *overall goals and direction promote accessibility and transport efficiency over environmental qualities* and also aim to attract an increasing number of businesses to the city center.

Several newspaper articles and policy documents have provided insights to the consequences of the national goals over the regional and local ones. These were explored briefly in the case study analysis which evidenced that there were public enquiries about the project and concerns about the development as a whole for the public. Many of the concerns have now been addressed though, due to the creation of the Gent info punt, which centers itself to *communicate about the project*.

The project now finds itself on track to completion, yet it remains questionable to what extent the environmental compensation measures and soil re-use strategy adopted in the project indeed contribute to sustainable urban development as a whole. The inability to identify *external private actors* in the project partnership points to evidence that there may be more opinions and issues, that if considered, could yield more positive results for the management of soils.

9.1.3 Stuttgart

Several factors found in this case study have resulted in an integrated approach which has helped to realize sustainable soil management during urban redevelopment. These key factors are the use of a long-term time perspective which involved overseeing the effects of the project for the end-users and required sufficient gathering of relevant scientific information, and the formalization of a partnership between public spheres. It was apparent in the case study however that the planning phase which took about 16 years has also been criticized for being too long, leading to a strong polarization of sides for and against the project.

Overall the planning of S21 resembles a top-down policymaking procedure using a *very technical-oriented approach.* The final project goals promote *economic and social welfare more so than direct soil considerations* although the environmental procedures followed are expected to result in drastic improvements in the central city area.

The internal public nature of decision-making by higher authorities in the S21 planning process as critics put it, have raised concerns about accountability, transparency, as well as the overall democratic legitimacy of the project (Novy & Peters, 2012). They argue that the legislatures, as well as the general public, had been misled about the pros and cons during the decision-making process. Furthermore DB AG's status, effectively acting as a private but still state-owned and quasi-monopolistic railway operator is a key source of conflict and controversy.

Novy & Peters (2012) argue that projects such as S21 have assumed an important position in policy agendas. These agendas are driven by the heightened relevance of railway travel in the modern capitalist world and the introduction and expansion of high-speed train networks, investments in rail infrastructures and the

(re)development of inner-city rail stations. They go on to state that projects as large as S21 are legitimized through policy beliefs, including the promotion of integrated land-use and transport development and the promotion of more environmentally-friendly modes of transport. Yet at the core of such projects they argue are local agendas for urban growth and competitiveness resembling neoliberal forms of governance which ultimately lead to fragmentation in urban areas.

In this research the main findings in Stuttgart do point to a technocratic stance to ameliorate environmental qualities. The application of BOKS represents the technical application for soil management, yet seems to engage some normative and organizational ideals. In this way the project development is considered to be integrated extensively. However it is important to consider the outcomes of such a project as well. Although the lack of exact figures represent a downfall in this research it has been acknowledged that the development of the project will significantly increase parks and green spaces in the city center, for which soil quality must be of a sufficient standard.

9.1.4 Lyon

Important factors found reflect those also present in the other case studies. They include a high level of political commitment to manage the integrated process, the use of a long-term time perspective which involves the monitoring of soil conditions with the use of standardized indicators adjusted through time, relevant scientific information from international organizations, and the formalization of a partnership between public spheres affecting the accountability mechanisms for each partners' use of soil and identification of sustainability issues.

Lyon Confluence, similar to Stuttgart S21, is a prime example of a *modern development project with large investments in infrastructure*. The project has been legitimized because of the *practical needs* for improving the quality of life on the peninsula area, and also *to benefit more from the prime location* of the peninsula in the greater Lyon area. The project *relies to a large extent on external parties*, both for advice as well as contracting. In this sense the project may have been pushed towards the concept of an energy efficient peninsula as a main goal. Yet overall the sustainability agenda for Lyon is highly prized by international organizations such as the EU. Effectively all the attention from external parties that want to promote Lyon Confluence as a masterpiece of sustainability also helps to direct attention to the direct environmental issues experienced on the peninsula. In this sense soil quality has been recognized as a real-time issue. Especially the building of a new nautical facility on the peninsula has prompted many soil studies to be carried out and has interrelated this with groundwater. The main concern was to minimize risks for the population expected to use the facility. Additionally the project development is expected to ensure approximately 35 ha of green space on the peninsula which also helps to promote soil, as it has to be of a sufficient quality to ensure the biodiversity goals set up through the use of individually designed indicators.

9.2 Key differences & similarities

The table below (table 21) provides an overview of key findings in each of the case studies. The table contains both similarities and differences. Initially it was thought that similarities marked universally applicable and important factors for integration. However, key differences essentially also entail new ways of thinking and could therefore also represent a key factor for integration. Therefore the table sums up all the factors for each case study that were considered important. It is suggested that the sum of factors together constitutes integration. Thus relying heavily on solely one factor is not expected to contribute to an integrated approach where soil management practices are improved, rather a combination of them is expected to yield positive results.

	Utrecht Central Station Project (CU2030)	Stuttgart (S21)	Gent-Sint-Pieters	Lyon (Lyon-Confluence)
Total (expected) Investment costs	3.2 billion euros	4.1 billion euros	496 million euros. 5% paid by the municipality of Gent	1.8 billion euros
Start year construction	2010	(1994), 2010	2006	2003
Urban	90 ha	100 ha	8 ha	150 ha

redevelopment area				
Population	316,448	600,068	247,486	467,000 (approx.)
Partners	• Gemeente Utrecht • Corio • ProRail • NS • Jaarbeurs Utrecht	• European Union • The federal government (BUND) • The state of Baden-Württemberg • German Railway (Deutsche Bahn AG) • The city of Stuttgart • The Stuttgart Region	• Stad Gent • Eurostation • NMBS-holding • De Lijn • Infrabel • Agentschap Wegen en Verkeer	• WWF • Greater Lyon • SPLA (local public redevelopment company) • (Nedo, since 2011)
Innovative Outcome(s)				
	• Large quantity of soil preserved. • Some clean soils experience soil quality loss • Overall regional/local soil quality expected to improve • Redevelopment of brownfields applied • Improvement in green qualities for the city	• Large amount of soil excavations for infrastructure • Compensation measures include creating parks above underground rail infrastructure • Redevelopment of brownfields applied	• Exploitation of 'good' quality soil due to numerous excavations • Exploited soils will be reused, however not necessarily at local/regional scale • Some compensation measures, including a new park • Redevelopment of brownfields applied	• It is unclear as to how much soil will be exploited as the project focuses on revamping the peninsula rather than rebuilding. • Compensation measures are in place with approximately 35 ha of land dedicate to greening. • Redevelopment of brownfields is taking place as is part of rules & regulations for urban planning.
Description of factors				
Institutional features	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • Not all the actors have direct goals for soil management, but are in favor of revitalization the inner city. Power: • Leadership is displayed by the Gemeente Utrecht (public organization) who over the years have consistently promoted redeveloping the	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • Some of the actors have goals for soil management(EU) while some more actively promote brownfield redevelopment. Power: • Leadership is displayed by three main players. Out of those, DB (public organization) coordinates the project showing leadership	Objectives: • Project goals for soil in the redevelopment project are defined nationally and refined in order to promote regional implementation. • None of the actors have direct goals for soil management but do promote brownfield redevelopment. Power: • Leadership is displayed by three main players. Eurostation (public organization) is the main coordinator for the project	Objectives: • Soil management goals are refined from national standards to promote regional implementation • Not all the actors have direct goals for soil management, but to stay a front runner in sustainability it must be considered. Power: • Leadership is shown by public agencies representing the greater Lyon council – SPLA, and SEM Lyon Rules and Regulations: • A top-down dialogue with

	area. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory, • Communication tools for soils are still being developed, but there is a clear recognition of the interrelatedness between soil and groundwater as well as soil and energy.	functions. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory. The use of BOKS represents a new way to ensure soil management. Communication tools for soils are still being developed. There is recognition of the interrelatedness between soil and groundwater.	however. Rules and Regulations: • Originally a top-down dialogue displaying decentralized activities through the collaboration with other parties. • Soil reports are mandatory, Communication tools for soils are still being developed. There is recognition of the interrelatedness between soil and groundwater.	decentralization of tasks in a bottom-up manner as well as networked globally. • Soil reports are mandatory and are done through Ademe Communication tools about soil exist (Basol & Basias). These recognize relationships with other activities. Communication to the wider public could be improved.
Actor features	Actors: • A mix of public and private actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate intensively. Interaction: • The Gemeente Utrecht is the main partner in charge to create an identity about soil and communicate the importance of them.	Actors: • The actors consist of only public actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate about the project. Interaction: There are three partners in charge to create an identity about soil and communicate the importance of them.	Actors: • The actors consist of only public actors. • Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate about the project. Interaction: There are three partners in charge to create an identity about soil and communicate the importance of them.	Actors: • The main actors consist of public actors and an NGO. The NGO acts in the interest of the public • The public nature of the main project partners represents a top-down form of rule. Interaction: Soil is not directly communicated per say. But the holistic sustainable approach, especially energy and building sustainability, has been widely advocated. The project is recognized and funded by the EU CONCERTO.
Policy-content features	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes,	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes,	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes,	Time: • The project is studied for its impact in the future. Taken into consideration are future land-use changes,

	and the impacts of those changes on soil. • The time between project initiation and project construction was 8 years. Planning a project is a crucial step. Knowledge: • Scientific information is considered important. In Dutch legislation significant progress has been made to determine 'bad' and 'good' soils and understand soil potential and function. • Advisory committees constitute external actors to the project. In this case CityChlor, as well as the architect firm Benthem Crouwel have been identified as key advice organizations. Resources: • Actor expertise is mostly limited to the service sector. The actors rely on engaging with the public to sell services. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources by considering a regional scale. In this way the functions of soils and its values are shaped by a larger pool of knowledge. • Regulations	and the impacts of those changes on soil (BOKS). • The time between project initiation and project construction was 16 years. Planning a project is a crucial step yet this may be considered too long, leading to polarization of sides for and against project. Knowledge: • Scientific information is used. In German legislation indicators are used to determine 'bad' and 'good' soils and understand soil potential and function. • Advisory committees were not directly identified. The main partners aim to engage other actors throughout the project development. Resources: • Actor expertise is limited to the public sector. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources but has extended this beyond the region through considering the national scale and international scale. In this way the functions of soils and its values are shaped by a	and the impacts of those changes on soil (OVAM). • The time between project initiation and project construction was 8 years. Planning a project is a crucial step. Knowledge: • Scientific information is used. In Belgian legislation indicators are used to determine 'bad' and 'good' soils and understand soil potential and function. • Advisory committees were not directly identified. The main partners aim to engage other actors throughout the project development (GentSintPieters) Resources: • Actor expertise is limited to the public sector. The actors all engage with the public to provide services which cover various infrastructures. • Impact assessment measures and the use of indicators are standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources but has extended this beyond the region through considering the national scale. In this way the functions of soils and its values are shaped by a larger pool of knowledge. But	and the impacts of those changes on soil. • The time between project initiation and project construction was 4 years. It is acknowledged that the planning phase of a project is a crucial step. Knowledge: • Scientific information is considered important. In French legislation progress has been made to determine 'bad' and 'good' soils and understand soil potential and function. This is partly done through Ademe and its partner organizations. • Advisory committees constitute external actors to the project. In this case there are many externally contracted actors identified as key advice organizations. They offer key suggestions for the development of the project. Resources: • Actor expertise is unlimited but with a key focus on the energy sectors. The actors rely on networking internationally to show off the impact of the project development and obtain important grants. • Impact assessment measures and the use of indicators are

	require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.	larger pool of knowledge. But the impacts do not remain local. • Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.	the impacts do not remain local. Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.	standard and embedded in legislation. Environmental Policy: • Planning behavior in this project has considered soil resources by considering the regional scale of the peninsula. The functions of soils and its values are shaped by the objectives of the peninsula. Regulations require actors of new redevelopment projects to account for soil issues. In this way externalities for soil use are taken into consideration.

Table 21: Case study Comparison

Chapter 10: Conclusions & Recommendations

10.1 Introduction

This chapter provides conclusions and recommendations, *derived from studying literature, knowledge gained from the workshop and comparing the case studies used in this research*. First some main conclusions will be explained, and this will be followed by key recommendations.

It has been found in this research that as soil is a limited resource often not all the demands of the land users can be met, especially in urban areas with high population densities. But in order to steer the use of urban soils in a sustainable way, a proper management of soil resources is needed. Soil management systems that efficiently protect the best soils should be introduced in cities and these can best be found by studying the overall governance situations applied in various cities.

10.1.1 Actor features

Overall large-scale urban redevelopment projects have become relatively complex due to the involvement of multiple actors with divergent interests and expectations. This research has explored in relative detail soil management efforts of four redevelopment projects of different scales and comprised of different partnership relationships. It has become evident that in this world of shared-power, no one is fully in charge; 'no organization contains the problem' as Kettl, 2002 puts it. Instead, many groups, individuals, and organizations are involved and affected, which each have some partial responsibility to act. As such, in this research it has been found that a *multidisciplinary* approach is necessary for better understanding of the soil role in urban environment in order to ensure its optimum use, which is also recognized by the authors De Kimpe & Morel (2000). A multidisciplinary approach is necessary because it is expected to be able to provide information of the functions needed, like water filtering and storage, space for fauna and flora in the city, which can help to ensure important socio-economic features can encourage those functions.

Utrecht	Gent	Stuttgart	Lyon
• Top-down initiatives completed by decentralizing tasks, i.e. giving the other parties the opportunity to collaborate intensively.	• integration of policies and goals, although present, is confined to primarily serve national interests, suggesting the need for a multi-actor partnership.	• more agreements on participation and administrative issues were made throughout the course of the project development to overcome the polarization for and against the project.	• encouraged both by transport authorities and politicians who recognized the importance of renewing infrastructure. Now with this multi-disciplinary approach the project is recognized internationally for its sustainability.

Table 22: Conclusive actor features per case study

10.1.2 Policy-Content features

It has been found in this research that nowadays a wide variety of remediation methods is available and applied. Although not explicitly mentioned, the common characteristic of these methods is that they aim to limit human and ecosystem exposure risks as well as prohibit (further) migration of contaminants. This implies that the local situation, the future use of the site and the contamination itself, together will determine what kind of remediation is possible.

This means that environmental policy requires that land users need not only be aware of the physical soil degradation processes induced by their activities but also of the prevailing soil conservation policies in the future so as to be able to comply with rules or implement voluntary measures respectively. Therefore, communication as well as *availability and distribution of information* between actors at *multiple levels* as well as *advisory support* for land users are crucial for the implementation of policies and their effective usage. Furthermore, *continuous scientific support for authorities* is also important in order to develop and improve not only the prevailing legal framework but also other aspects, like communication channels (Prager et al. 2011) about the importance of soils.

Given that the case studies observed the use of environmental indicators to determine sustainability aspects of soil it is imperative that these do not contradict a *definition of soil, its role and functions for society*. It is established in this research that it is important not only to clearly define soil but also to point out the fundamental role of soil to terrestrial ecosystems, which includes that *changes of the soil affect ecosystem functions* (Hannam and Boer 2004; MEA, 2005). Another conclusion therefore includes the need to assess soil over a *larger scale* that overlaps with *ecosystem concepts*.

Utrecht	Gent	Stuttgart	Lyon
• Focus on long-term time-horizon which helps to improve overall soil quality over the large project area.	• A longer term time horizon with which required binding administrative agreements was essential to keep the project on track. To do this it was recognized that information ought to be better shared.	• The application of BOKS principles is seen as an important step in ensuring sufficient scientific data is used. It is important because of the technical ambitions of the project to have sufficient knowledge of the current environmental situation and helps to provide ideas for improvements.	• The SWOT analysis conducted on the whole peninsula is seen as a beneficial part of the project for environmental sustainability purposes. Not only does it require expertise from different angles, but also it supports an area approach.

Table 23: Conclusive policy-content features per case study

10.1.3 Institutional features

A crucial element of national soil legislation is the existence of a *soil authority*, acting as an independent body committed to stated objectives with well-defined responsibilities. Generally this requires a *top-down approach* and this was the case in each of the case studies. The independent body requires a well-defined purpose and objectives as it is used as a legal instrument. It should be able to comprehensively state the primary purpose for soil management and the objectives thereof as Hannam and Boer (2004) recognize. Its task is to carry out various functions concerning soil conservation, such as undertaking research, education, soil assessments etc. Furthermore, although not explicitly stated, it should be supported by a sufficiently high budget so as to overcome stagnated urban development processes which could lead to public distrust about the project.

The top down approach is ideally recognized legitimately and further supported by *extended advisory services*. This can help in assuring information distribution and widening the knowledge of interrelated issues concerning soils. Although this includes the need for more local administrative staff which results in increased of costs, it could lead to cost savings in the future (Prager et al. 2011). However, investments by the government or other interested stakeholders might be indispensable.

The final conclusion found in this research is that sustainable soil management in the urban environment should favour development in urban centres by means of land rededication and help prevent suburban sprawl. Many regional planning strategies already incorporate, and in some cases have begun implementing, a trend reversal in urban development by prioritising inner-city development over peripheral development which was clearly noticeable in all the case studies. The aim of such development is to dedicate land to new residential and commercial uses primarily in existing urban areas rather than unnecessarily promoting suburbanisation with large new greenfield developments. In this way soil functions and values can be preserved which entails the ideal sustainable soil management practice as it can then fulfill the its role of providing vital socio-economic functions.

Utrecht	Gent	Stuttgart	Lyon
• Refining of national goals by external advisory services has led to this project considering soil conservation goals. This is seen as a	• Although national goals for soil have been refined for the region, the lack of extended advisory committees due to the lack of direct	• There are many regional principles to tackle unsustainable soil issues. Leadership is shown by the regions who have started to	• regional soil standards exist which have been derived with the help of external advisory parties such as Ademe. The

more positive soil management strategy compared to exploitation which requires increased funds to transport soils and also generates more pollution in doing so.	project partners resulted in a single remediation case. The exploitation of soil is not seen as being a particularly unsustainable development in the scheme of the project.	involve more external actors in the project.	result is the use of indicators on the whole peninsula to ensure that fundamental environmental issues caused by soil contaminations are dealt with.

Table 24: Conclusive Institutional features per case study

10.2 Recommendations

The recommendations described below have been derived from the combination of all the research elements in this thesis; *the workshop, the literature review and the case studies*. The recommendations should not be seen as fixed or engraved in stone because this research applied a governance framework to study important features for integration. The governance framework is primarily intended to measure the changing transitions of environmental relationships. It could be that in the future new innovations in integrative management yield improved results for soil management, but at present these recommendations best reflect current trends. It is interesting to note that the recommendations derived in this report reflect some recommendations put forth by the European Commission noted in their guidance report for integrated environmental management released in 2007 [see http://ec.europa.eu/environment/urban/pdf/iem.pdf], as well as the thematic paper on soil management released by the EU on February 2012 [see http://ec.europa.eu/environment/soil/three_en.htm].

10.2.1 Key features for realizing Integration

1) Urban development should be based upon an integrated development concept which should be made up of knowledge that constitutes the strengths and weaknesses of the city and region. In this way the strengths and weaknesses can be incorporated into an ecosystem management approach.
2) The strengths and weaknesses should include a number of attainable goals for various areas, which can be combined so that a larger number of actor interests are considered and dealt with.
3) Ideally a mix of public and private actors should be encouraged to participate in the project to help with financial resources as well as spread knowledge. In some instances (such as the Lyon case), a network of policy areas and actors in the political and administrative realm could be beneficial.
4) As mentioned an ecosystem management approach is favoured. This requires an area-based approach rather than an individual plot-based approach. Such an approach provides not only a basis for the identification of problems and potentials of individual urban areas (neighbourhoods), but also for communication and cooperation between all actors involved.
5) A prerequisite for the success of integrated urban development is the multidisciplinary collaboration of political and administrative levels (EU, national, regional, local). This has been highly recommended by the EU and is observed in the case studies.
    a. The requirement for success thus involves national programmes which should be better coordinated by improving soil definitions and guidelines
    b. External funding programmes should be integrated into national settings
    c. Local budgets from different subject areas must be linked to each other and brought in line with funding programmes. The integration of non-governmental actors is increasingly playing an important role and entails the pooling of resources which is necessary to overcome stagnations in development during bad economic tides.
6) The inclusion of local residents and entrepreneurs in urban development is seen as important. Sustainability issues are most often felt at the local level suggesting that their participation is crucial. Not only are they experts of the situation on the ground, its problems and potentials, but their everyday life also creates their community's development. Tools supporting participatory processes therefore need to be continually refined and developed in order to meet the specific requirements of participation.
7) Finally the administration and organization of an integrated urban development project should address both the complexity and potentials of problems to come up with the best mix of solutions for

sustainable soil management. They should clearly communicate alternative solutions to avoid particular interests from more powerful actors being considered over others.

Chapter 11: Reflection on Research Methodology

The aim of this thesis was to provide a research that describes an ideal governance typology for the integration of sustainable soil management, and compares and contrasts this to practical examples. Although the aim has been fulfilled the methodology for obtaining the relevant data was adapted during the course of the research. Initially it was assumed in this research that actors involved in the chosen redevelopment projects would fully cooperate. The goal in terms of interviews was to interview a representative from each partner and average the scores derived from their answers to develop an unbiased score to represent a quantifiable level of integration. It was thought that they would be comfortable filling in the question sets used which made use of a numerical value to denote a level of integration (see appendix 2, 3 & 4). However during the course of the research it became apparent that the actors and interviewees approached were not able to attach values to the questions. There are two main reasons why the approached interviewees were unable to fill in the question sets. Some responded that they did not have sufficient knowledge about the project as a whole, while others responded that they lacked knowledge about the specific issues related to soils and how these were taken care of. In some cases the representatives approached were newly installed in the organization and did not have sufficient background information to evaluate linkages of their organization with other actors.

As a response to the difficulties in obtaining numerical values to denote a level of integration it was chosen to re-evaluate the chosen approach. Although the question sets remained unaltered they were used in a different way; namely as an interview guide. The new approach resulted in the need for a more intense literature review on the case studies in order to explain the descriptive answers given by the interview respondents.

The knowledge gap addressed in this research sought to understand the arrangement of actors and how they interact with each other to realize integration efforts. This gap was addressed in the literature which described that in present day urban development one can simply no longer function without cooperation and collaboration within and between actors from public and private parties (van der Veen & Korthals Altes, 2011). Literature on integration stresses the importance of creating common goals, creating a common identity, ensuring feasibility and ensuring future benefits. Literature on integration also stresses the need for multiple actors in order to realize integration. Policy integration involves generating coherence of policies across sectors and coordinating those policies across sectors. All this literature points to the relevance of studying governance, defined as the process of making and implementing decisions on behalf of a group (Snickars et al., 2002, p.96). However, planning and plans are often used by all forms of government as a tool for making decisions in urban areas. While it seems evident that planning is defined as an input to the decisions made by those who govern a more complex definition of planning reads 'a technique and communication aiming at organizing knowledge to provide a basis for decision-making of future collective action' (Sager in Snickars et al., 2002, p.97).

It has been found throughout the course of this thesis that urban redevelopment planning is complex because of the changing role of governors and planners in the urban development arena. Although the case studies pointed out the changed responsibility relationships between government levels for the proper management of soil where regional governments have been willing to take over and coordinate their own activities (Snickars et al., 2002, p.101), it failed to fully include the importance of the role of planning. Although this thesis did not cover the role of planners in depth it would be recommended for further research. Especially interesting would be to assess the goals of planning - scientific efficiency, civic beauty and social equity (Snickars et al., 2002, p.106) - in relation to the goals of final decision-makers.

The main research question in this thesis read *"What factors in an integrated urban management approach contribute to sustainable soil management during urban redevelopment?"*. Overall the research question has been addressed in a descriptive-based research that combined a literature study with case studies. What is interesting is that the research recognized that the value of a certain area in the urban landscape is to a large degree dependent upon the environmental context i.e. the value is dependent upon actors relations with the area. It is therefore no secret that different actors have differing opinions of how and what to develop (DiPasquale and Wheaton, 1996 in Snickars et al., 2002, p.384). In fact the case studies have shown that there is often no clear understanding from both the public and private arenas about the complex values constituted by specific buildings and the values at stake in the area. As such an integrated urban management approach reflects a complex management strategy. It was attempted to break down the complexity of the main research question by considering particular aspects in the literature and in practice, the reason being that covering the whole body of integration is extensive and exhausting.

It was expected that a governance lens on integration for soil management could narrow down indispensible integration factors and provide invaluable information for future redevelopments. In some respects this has been the case, but caution should be uttered as the research only included 4 case studies. Furthermore the inability to quantify the importance of factors still leaves open the debate about the importance of them, although the universal applicability of them does hint at 'best practices'. For the purposes of further research it would be suggested to indulge in the key similarities and differences and try to refine the framework such that quantifiable results can be sought and actual hard facts about the key factors can be presented.

12 References

- Ademe (2011). 'French know-how in the field of soil and groundwater remediation', Obtained from <http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=12&cad=rja&ved=0CCoQFjABOAo&url=http%3A%2F%2Fwww2.ademe.fr%2Fservlet%2FgetBin%3Fname%3D85AB89EC705B13319475B422D71FAC831296208109568.pdf&ei=jTiiUIvbIpO10QW0sYHADg&usg=AFQjCNHhF6jsvTKjboxpVPOOWHHbpFwwQg&sig2=xn1KR1iwnw1wDmUHI3oGFA>.

- Ademe (2012). 'Agence de l'Environnement et de la Maîtrise de l'Energie : Sites pollués et sol', obtained on July 9, 2012 from <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=10150>.

- Agenda 21 (2009a). 'Integrating Environment & Development in Decision-Making', obtained on July 11, 2012 from <http://www.un.org/esa/dsd/agenda21/res_agenda21_08.shtml>.

- Agenda 21 (2009b). 'Integrated Approach to the Planning & Management of Land Resources', obtained on July 11, 2012 from <http://www.un.org/esa/dsd/agenda21/res_agenda21_10.shtml>.

- Agentschap.nl (2010). 'Into Dutch Soils', *Ministerie van VROM,* Obtained from <http://www.agentschapnl.nl/sites/default/files/sn_bijlagen/into_dutch_soils-24-334830.pdf>.

- Agentschap.nl (2012). 'Bodembeleid', Obtained from <http://www.agentschapnl.nl/onderwerp/bodembeleid>.

- Baden-Wuerttemberg (2012). 'Baden-Wuerttemberg Regionen', Obtained from <http://www.baden-wuerttemberg.de/de/Regionen/85734.html>.

- Bahnprojekt (2012). 'Bahnprojekt Stuttgart-Ulm', Obtained from <http://www.bahnprojekt-stuttgart-ulm.de/>.

- Batley, R. & Stoker, G. (1991). 'Local Government in Europe', *Macmillan, London.*

- Bekkering, H., Paul Drewe, Jan Heling, Willem Hermans, Frank van der Hoeven, Edward Hulsbergen, Han Meyer, Anna Vos, John Westrik (1998). 'Stedelijke Transformaties: Actuele opgaven in de stad en de rol van de stedeboukundige discipline', *Delftse Universitaire Pers,* p.p. 1-190.

- Bentivegna, V., Steve Curwell, Mark Deakin, Patricia Lombardi, Gordon Mitchell, Peter Nijkamp (2002). 'A vision and methodology for integrated sustainable urban development: BEQUEST', *Building Research & Information,* 30(2), p.p. 83-94. Obtained from <http://www.tandfonline.com.proxy.library.uu.nl/doi/pdf/10.1080/096132102753436468>.

- BMU (2002). 'German Federal Government Soil Protection Report', *Federal Ministry for the Envrionment, Nature Protection and Nuclear Safety,* Obtained from <http://www.bmu.de/files/pdfs/allgemein/application/pdf/soilreport.pdf>.

- Bolitho, A. (2010). 'Lyon Confluence', *France Today,* obtained from <http://www.francetoday.com/articles/2010/07/21/lyon_confluence.html>.

- Briassoulis, H. (2004). 'Policy Integration for Complex Policy Problems: What, Why and How', Presented at the 2004 Dec 3-4 Berlin Conference "Greening of Policies: Interlinkages and Policy Integration". Obtained from < http://www.geocities.ws/policy_making/en/publicpolicy/environmental_policy.pdf>.

- Briassoulis, H. (2005). 'Policy Integration for Complex Environmental Problems: The Example of Mediterranean Desertification', *Ashgate Studies in Environmental Policy and Practice,* Ashgate Publishing Limited.

- Brugha, R., and Z. Varvasovsky (2000). 'Stakeholder analysis: a review', *Health Policy and Planning*, 15(1), p.p. 239–246.

- Bryson, J.M. (2004). 'What to do when stakeholders matter: Stakeholder identification and analysis techniques', *Public Management Review*, 6(1), p.p. 21-53.

- Bulkeley, H. & Kern, K. (2006). 'Local Government and the Governing of Climate Change in Germany and the UK', *Urban Studies,* 43(12), p.p. 2237-2259.

- Bundesregierung (2012). 'Function and Constitutional Basis', Obtained from <http://www.bundesregierung.de/Content/EN/StatischeSeiten/breg/federal-government-function-and-constitutional-basis-structure-and-tasks.html?nn=393254>.

- BVBS (2012). '5 years after the LEIPZIG CHARTER – Integrated urban development as a prerequisite for a sustainable city' . Available at <http://www.nationale-stadtentwicklungspolitik.de/nn_244664/Content/__Anlagen/leipzigcharta__en,templateId=raw,property=publicationFile.pdf/leipzigcharta_en.pdf>.

- CABERNET (2012). 'CABERNET', obtained on June 19, 2012 from <http://www.cabernet.org.uk/index.asp?c=1134>.

- Campbell, S. (1996). 'Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development' , *Journal of the American Planning Association,* 63(3), p.p. 296-312. Available at <http://www.tandfonline.com.proxy.library.uu.nl/doi/pdf/10.1080/01944369608975696>.

- Carter, M.R. (2002). 'Soil Quality for Sustainable Land Management: Organic Matter and Aggregation Interactions that Maintain Soil Functions', *Agronomy Journal,* 94(1), p.p. 38-47.

- Clement, K. (2005). 'Editorial Environment and Sustainable Regional Development', *European Environment Eur.,* 15, p.p. 263-265.

- Concerto.eu (2012). 'The CONCERTO initiative', *CONCERTO,* Obtained from <http://concerto.eu/concerto/about-concerto.html>.

- Coppens, T. (2007). 'NIMBY as a self-fulfilling construct: Local opposition in urban regeneration in Flanders', *43 ISOCARP Congress 2007,* Obtained from <http://www.isocarp.net/Data/case_studies/968.pdf>.

- CU2030 (2012). Obtained from <http://cu2030.nl/>

- Dale, A. & Lenore Newman (2005). 'Sustainable development, education and literacy', *International Journal of Sustainability in higher education,* 6(4), p.p. 351-362. Obtained from <http://dx.doi.org/10.1108/14676370510623847>.

- De Kimpe, C.D. and Morel, J. (2000). 'Urban soil management: a growing concern', *Soil Science,* 165, p.p. 31-40.

- De Lopez, T.T. (2001). 'Stakeholder management for conservation projects: a case study of Ream National Park, Cambodia', *Environmental Management*, 28, p.p. 47–60.

- De Sousa, Christopher A. (2006). 'Urban brownfields redevelopment in Canada: the role of local government', *The Canadian Geographer,* 50(3), p.p. 392-407. Obtained from <http://onlinelibrary.wiley.com.proxy.library.uu.nl/doi/10.1111/j.1541-0064.2006.00148.x/pdf>.

- Doran, J.W. & Parkin, T.B. (1994). “Defining and assessing soil quality” in :Doran, J.W., Bezdicek, D.F., Coleman, D.C. (Eds), ‘Defining Soil Quality for a Sustainable Environment (SSSA Special Publication no. 35, p.p. 3-21).’ *Soil Science Society of America.*

- Dorle, J. (2011). ‘Economic Perspectives of Brownfield Development in Germany’, *City Chlor_WP4.*

- Driessen, P.P.J., Dieperink, C., van Laerhoven, F., Runhaar, H.A.C., & Vermeulen, W.J.V. (2012). ‘Towards a Conceptual Framework for the Study of Shifts in Modes of Environmental Governance – Experiences from The Netherlands’, *Environmental Policy and Governance,* 22, p.p. 143-160.

- Du Pisani, J. A. (2006). ‘Sustainable development - historical roots of the concept’, *Environmental Sciences*, 3(2), 83-96.

- EC (2007), ‘Integrated Environmental Management: Guidance in relation to the Thematic Strategy on the Urban Environment’, Obtained on July 4, 2012 from <http://ec.europa.eu/environment/urban/pdf/iem.pdf>.

- EC (2009). ´Promoting sustainable urban development in Europe´, *European Union Regional Policy,* Brussels, p.p.1-59. Obtained on July 30, 2012 from <http://www.ec.europa.eu/regional_policy/sources/docgener/presenta/urban2009/urban2009_en.pdf>.

- EC-JRC (2012). ‘European Soil Portal – Soil Data and information Systems’, *European Commission Joint Research Centre,* obtained on June 18, 2012 from <http://eusoils.jrc.ec.europa.eu/library/themes/Sealing/>.

- Eckersley, R. (2004) ´The Limits of the Liberal Democratic State´ and ´From Liberal to Ecological Democracy´ in: R. Eckersley: *The Green State. Rethinking Democracy and Sovereignty,* MIT Press, 2004, 85-138.

- Economist Intelligence Unit (2009). ‘European Green City Index: Assessing the environmental impact of Europe’s major cities’, *Siemens AG,* obtained on July 9, 2012 from <www.siemens.com/press/pool/de/events/corporate/2009-12-Cop15/European_Green_City_Index.pdf>.

- Eden, C., Ackermann, F. (1998). ‘Making Strategy: the Journey of Strategic Management’, *Sage Publications*, London.

- EEA (2010). ‘Soil – SOER 2010 thematic assessment’. Obtained from <http://www.eea.europa.eu/soer/europe/soil>.

- Esteves A. M. and Barclay M. A., (2011). ‘New Approaches to Evaluating the Performance of Corporate-Community Partnerships: A Case Study from the Minerals Sector’, *Journal of Business Ethics*, 103(2), p: 189-202.

- EU (2012). ‘Basisinformatie over de Europese Unie’, Obtained from <http://europa.eu/about-eu/basic-information/index_nl.htm>.

- Eurostation (2012) ‘Ghent Sint-Pieters’, Obtained from <http://www.eurostation.be/en/projects.htm>.

- Falkner, R. (2003). ‘Private Environmental Governance and International Relations: Exploring the Links’, *Global Environmental Politics*, 3(2), p.p. 72-87.

- Florini, A.M. (2000). “Theoretical Considerations: The Changing Nature of Authority Relations” in R.A. Higgot, G.R.D. Underhill, A. Bieler (eds.), ‘Non-state Actors and Authority in the Global System’, 2000, p.p. 15-31.

- FOKS, (2009). ‘5th International Conference Innovative Solutions for Revitalization of degraded Areas’ , *Focus On Key Sources of Environmental Risks.* Obtained from <http://projectfoks.eu/wp-content/uploads/2009/07/4_t_ertel_environmental_forensics_in_contaminated_sites_management_.pdf>.

- Gay, S. H, G. Louwagie, F. Sammeth, T. Ratinger, B. Maréchal, P. Prosperi, E. Rusco, J. Terres, M. van der Velde, D. Baldock, C. Bowyer, T. Cooper, I. Fenn, N. Hagemann, K. Prager, N. Heyn, and J. Schuler. (2009). Final report on the project ‘Sustainable Agriculture and Soil Conservation (SoCo)’, *European Commission, Luxembourg*. Obtained from < http://soco.jrc.ec.europa.eu/documents/EUR-23820-web.pdf>.

- Geerlings H. & Sluis-van Meijeren, M. van der. (2008). ‘The dominance of the Lisbon agreement as a barrier fora n environmentally oriented transport policy in Europe: The gap between theory and implementation in policy integration’, *Transportation Research Board,* 39, p.p. 14-32.

- Geerlings, H. & Stead, D. (2003). ‘The integration of land use planning, transport and environment in European policy and research’, *Transport Policy,* 10(3), p.p. 187-196.

- Gemeente Utrecht (2006). ‘Strategische Milieubeoordeling Stationsgebied Utrecht Milieurapport’, *aanpak stationsgebied Utrecht,* December 2006, Obtained from <http://www.utrecht.nl/images/OGU/pos/pdf/SMB%20Milieurapport%20totaal_20061019.pdf>.

- Gent.be (2012). ‘Project Gent Sint-Pieters’, Obtained from <http://www.gent.be/gent.htm?id=148392>.

- GentSintPieters (2012). ‘Project Gent Sint-Pieters’, Obtained from <http://www.projectgentsintpieters.be/>.

- Glasbergen, P. (1992). ‘Seven steps towards an instrumentation theory for environmental policy’, *Policy and Politics,* 20(3), p.p. 191-200.

- Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). ‘Global Change and the Ecology of Cities’, *Science*, 319(756), 756-760.

- Hannam, I. and B. Boer (2004). ‘Drafting Legislation for Sustainable Soils: A Guide’, *IUCN, Gland, Switzerland and Cambridge.*

- Healey, P. (1998). ‘Building Institutional Capacity through collaborative approaches to urban planning’, *Environment and Planning A,* 30, p.p. 1531-1546.

- Hey, C. (2002). “Why does environmental policy integration fail? The case of environmental taxation for heavy goods vehicles” in A. Lenschow (eds) ‘Environmental policy integration: Greening sectoral policies in Europe’. *London: Earthscan.* p.p. 120-135.

- Hirschi, C. (2010). ‘Strengthening regional cohesion: collaborative networks and sustainable development in Swiss rural areas’, *Ecology and Society,* 15(4) article 16, p.p. 1-17.

- Huber, S. & Kurzweil, A. (2012). ‘Urban SMS: Guide for Municipal Soil Management’, Obtained on July 7, 2012 from <http://www.urban-sms.eu/fileadmin/inhalte/urbansms/pdf_files/final_results/08_Guide_for_municipal_soil_management.pdf>.

- Hulsbergen, E. & Stouten, P. (2001). 'Urban Renewal and regeneration in the Netherlands Integration lost or subordinate?, City: analysis of urban trends, culture, theory, policy, action'. *Routledge.* 5(3). p.p. 325-337.

- Inch, A. (2012). 'Creating a generation of NIMBYs'? Interpreting the role of the state in managing the politics of urban development', *Environment and Planning C: Government and Policy,* 30, p.p. 520-535.

- JEEPL (2006). 'Soil Protection in French Environmental Law', *JEEPL,* Obtained from <http://www.fb-legal.com/0606%20JEEPL%20soil%20protection.pdf>.

- Jim, C.Y. (2004). 'Green-space preservation and allocation for sustainable greening of compact cities', *Cities,* 21(4), p.p. 311-320.

- Jordan, A. (2008). 'The governance of sustainable development: taking stock and looking forward', *Environment and Planning C: Goverment and Policy*, 26, 17-33.

- Kettl, D. (2002). 'The Transformation of Governance: Public Administration for Twenty-First Century America, *Baltimore, MD: John Hopkins University Press.*

- Klijn, Erik-Hans & Teisman, Geert, R. (2002). 'Institutional and Strategic Barriers to Public-Private Partnership: An Analysis of Dutch Cases', *British Academy of Management Conference 2002,* Middlesex University.

- Koontz, T. M. (2003). 'An Introduction to the Institutional Analysis and Development (IAD) Framework for Forest Management Research', *The Ohio State University School of Natural Resources*.

- Lafferty, W.M. & Hovden, E. (2003). 'Environmental policy integration: Towards an analytical framework', *Environmental Politics,* 12(3), p.p. 1-22.

- Lane, J. E. & Ersson, S. (1996). 'European Politics'. *Sage, London.*

- Leach D. W., Pelkey N. W. and Sabatier P. A., (2002). 'Stakeholder Partnerships as Collaborative Policymaking: Evaluation Criteria Applied to Watershed Management in California and Washington', *Journal of Policy Analysis and Management*, 21(4), p: 645-670.

- Lemos, M.C. and A. Agrawal (2006) ´Environmental Governance´, *Annual Review of Environment and Resources*, 31, p.p. 297-325.

- Lenschow, A. (2002). 'Environmental Policy Integration: Greening Sectoral Policies in Europe'. *London – Earthscan publications.*

- Lexer, W., S. Huber and A. Kurzweil (2010). 'Existing soil management approaches within urban planning procedures', *Urban SMS,* Obtained from <http://www.central2013.eu/fileadmin/user_upload/Downloads/outputlib/UrbanSMS_Soil_management_approaches_uploaded.pdf>.

- Linkov, I., F.K. Satterstrom, G. Kiker, C. Batchelor, T. Bridges, E. Ferguson (2006). 'From Comparative risk assessment to multi-criteria decision analysis and adaptive management: Recent developments and applications', *Environment International,* 32(8), p.p. 1072-1093. Obtained from <http://www.sciencedirect.com.proxy.library.uu.nl/science/article/pii/S0160412006000833>.

- Lundvall, B.-Å. (1992). 'National Systems of Innovation: Towards a Theory of Interactive Learning', *Pinter*, London.

- Lyon-Confluence (2012). 'Lyon Confluence – Bien vivre la ville', *lyon-confluence,* Obtained from <http://www.lyon-confluence.fr/>.

- MDG (2007). ´Millennium Development Goals Report 2007´, *United Nations*, New York. p.p.1-36. Obtained on April 10, 2011 from <http://www.un.org/millenniumgoals/pdf/mdg2007.pdf>.

- MEA (2005). 'Ecosystems and Human well-being: Current State and Trends', *Millenium Ecosystem Assessment,* Obtained from <http://www.maweb.org/en/Condition.aspx#download>.

- Meadowcroft, J. (2007) 'Who is in Charge here? Governance for Sustainable Development in a Complex World', *Journal of Environmental Policy and Planning*, 9(3-4), p.p.299-314.

- Meijers, E. & Stead, D. (2004). 'Policy Integration in practice: some experiences of integrating transport, land-use planning and environmental policies in local government', *Delft University of Technology,* Obtained from <http://userpage.fu-berlin.de/ffu/akumwelt/bc2004/download/stead_meijers_f.pdf>.

- MER (2005). 'MER Masterplan Station Gent Sint-Pieters en omgeving', Obtained from <http://www2.vlaanderen.be/ruimtelijk/grup/00150/00171_00001/data/212_00171_00001_4MER_NTS.pdf>.

- Newman, P. & Thornley, A. (1996). 'Urban Planning in Europe', *Routledge, London.*

- Niemelä, J. (1999). 'Ecology and Urban Planning', *Biodiversity and Conservation,* 8(1), p.p. 119-131.

- Nilsson, M. and Persson, Å. (2003). 'Framework for Analysing Environmental Policy Integration', *Journal of Environmental Policy & Planning,* 5(4), p.p. 333-359.

- NICOLE (2005). 'The Interaction between Soil and Waste Legislation between Ten European Countries', Obtained from <http://www.nicole.org/publications/Background%20document%20NICOLE%20Waste-Soil%20study.pdf>.

- Novy, J. & Peters, D. (2012). 'Railway Station Mega-Projects and the Re-Making of Inner Cities in Europe', *Built Environment,* 38(1), p.p. 1-145, Obtained from <http://www.geschundkunstgesch.tu-berlin.de/fileadmin/fg95/Datein_von_Mitarbeitern/Deike/Novy_Peters_2012_BEV38N1_Stuttgart_21.pdf>.

- Ostrom, E. (1999). 'Institutional Rational Choice: An Assessment of the IAD Framework', In Paul Sabatier, ed. *Theories of the Policy Process*. Boulder, CO: Westview Press.

- Ostrom, E. Roy Gardner and James Walker, (1994). 'Rules, Games, and Common Pool Resources', *Ann Arbor: The University of Michigan Press*.

- OVAM (2012) 'Bodem', Obtained from <http://www.ovam.be/jahia/Jahia/pid/11>.

- Paehlke, R. (1996) ´Environmental challenges to democratic practices´, in: W.M. Laffertu and J. Meadowcroft (eds.) *Democracy and the Environment. Problems and prospects,* Edward Elgar, 1996, 18-38.

- Persson, A., (2004). 'Environmental Policy Integration: An Introduction' , *Stockholm Environment Institute.* p.p. 1-49. Available at <http://www.sei-international.org/mediamanager/documents/Publications/Policy-institutions/EPI.pdf>.

- Pickett, S.T.A., Cadenasso, M.L., Grove, J.M., Nilon, C.H., Pouyat, R.V., Zipperer, W.C. and Costanza, R. (2001). 'Urban Ecological Systems: Linking Terrestrial Ecological, Physical, and Socioeconomic Components of Metropolitan Areas', *Annual Review of Ecology and Systematics,* 32, p.p. 127-157.

- Pickett, S.T.A., Cadenasso, M.L., Grove, J.M, Groffman, P.M., Band, L.E., Boon, C.G., Burch Jr., W.R., Grimmond, C.S.B., Hom, J., Jenkins, J.C., Law, N.L., Nilon, C.H., Pouyat, R.V., Szlavecz, K., Warren, P.S. and Wilson, M.A. (2008) 'Beyond Urban Legends: An Emerging Framework of Urban Ecology, as illustrated by the Baltimore Ecosystem Study', *Bioscience,* 58(2), p.p. 139-150.

- Polk, M. (2011). 'Institutional Capacity-Building in urban planning and policy-making for sustainable development: Success or Failure?', *Planning Practice & Research,* 26(2), p.p. 185-206.

- Prager, K., N. Hagemann, N. Heyn and J. Schuler (2011). 'Incentives and enforcement: The institutional design and policy mix for soil conservation in Brandenburg (Germany)', *Land Degradation and Development,* 22, p.p. 111-123.

- Pretty, J. (2003). 'Social Capital and the Collective Management of Resources', *Science,* 302(5652), p.p. 1912-1914.

- Ragin, C. C. & Rubinson, C. (n.d.). 'The Distinctiveness of Comparative Research', *The Sage Handbook of Comparative Politics.*

- Ravetz, J. (2000). 'City-Region 2020: Integrated Planning for a Sustainable Environment' , *Earthscan Publications London.*

- Renaissance (n.d.). 'Partenaires du Grand Lyon', *Renaissance,* Obtained from <http://www.renaissance-project.eu/spip.php?article175&lang=fr>.

- RIVM (2006). 'The Consequences of the European Soil Framework Directive for Dutch policy'. *MNP report 500094003,* Obtained from <http://www.rivm.nl/bibliotheek/rapporten/500094003.pdf>.

- Robinson, J. (2004) 'Squaring the circle? Some thoughts on the idea of sustainable development', *Ecological Economics,* 48, p.p.369-384.

- Rossy, A., P. T. Jones, D. Geysen, and K. Bienge (2010). '*Sustainable Materials Management for Europe. From efficiency to effectiveness*'. Report executed by Sustenuto, Catholic university of Leuven, and Wuppertal Institute for Climate, Environment and Energy. Available on the Internet at: <http://www.euractiv.com/sites/all/euractiv/files/SMMfor%20EuropeStudy_0.pdf>. Accessed on 22-11-2011.

- Rundcrantz, K. & Skarback, E. (2003). 'Environmental Compensation in Planning: A Review of five different countries with major emphasis on the German system', *European Environment,* 13(4), p.p. 204-226. Obtained from <http://onlinelibrary.wiley.com.proxy.library.uu.nl/doi/10.1002/eet.324/pdf>.

- Schadler, S., M. Morio, S. Bartke, R. Rohr-Zanker, M. Finkel (2011). 'Designing sustainable and economically attractive brownfield revitalization options using an integrated assessment model', *Journal of Environmental Management,* 92(3), p.p. 827-837.

- Schill, C. (2011). 'German Soil Legislation and Landcare in Australia and Germany – Lessons Learned for Effective Soil Conservation in Iceland', *Stockholm Resilience Centre,* Obtained from <http://www.gardarsholmur.is/wp-content/uploads/2012/03/Final-report-internship_Lessons-learned-for-effective-soil-conservation-in-Iceland_Caroline-Schill_20110809.pdf>.

- Scott, W. R. (2004). "Institutional theory", p.p. 408-14 in: Encyclopedia of Social Theory, Ritzer, G. (Ed.) Thousand Oaks, CA: Sage.

- Sedlacek, S. & V. Gaube (2002). 'Sustainable Regional Development in Austria – The role of regional institutions by implementing a sustainable regional pathway', *WU-Jahrestagung 2002,* Vienna, November 6-7 2002.

- Selsky J. W. and Parker B. (2011). 'Cross-Sector Partnerships to Address Social Issues: Challenges to Theory and Practice', *Journal of Management*, 31(6), p: 849-873.

- Smith, G. (2003) ´Deliberative democracy and green political theory´, in: G. Smith: *Deliberative democracy and the environment,* Routledge, 53-76.

- Sneddon, C. S., Howarth, R. B., & Norgaard, R. B. (2006). 'Sustainable development in a post-Brundtland world'. *Ecological Economics*, 57, 253-268.

- Snickars, Folke, Brita Olerup, Lars Olof Persson (2002), 'Reshaping Regional Planning: A Northern Perspective', *Urban and Regional Planning and Development,* Ashgate Publishing Limited.

- Soilquality (2012), 'Soil Quality for Environmental Health', Obtained from <http://soilquality.org/functions/function_lists.html>.

- Sorensen, Andre, Peter J. Marcotullio and Jill Grant (2004), 'Towards sustainable cities: East Asian, North American and European perspectives on managing urban regions'. *Urban Planning and Environment,* Ashgate Publishing Limited.

- Stroganova, M.N., A.D. Myagkova, T.V. Prokof eva (1995). 'The role of soils in urban ecosystems', *Eurasian Soil Sci.,* 30, p.p. 82-86.

- Stoker G., (1998). 'Governance as Theory: Five Propositions', *International Social Science Journal*, 155, p: 17-27.

- Swartjes, F.A., M. Rutgers, J.P.A. Lijzen, P.J.C.M. Janssen, P.F. Otte, A. Wintersen, E. Brand, L. Posthuma (2012). 'State of the art contaminated site management in The Netherlands: Policy framework and risk assessment tools', *Science of the Total Environment 427-428,* p.p. 1-10.

- Umweltbundesamt, (2007). '2nd International Conference on Managing Urban Land: Towards More Effective And Sustainable Brownfield Revitalisation Policies', *REFINA & BMBF*.

- Urban SMS (2011). 'Urban SMS Project', obtained on July 12, 2012 from <http://www.urban-sms.eu/urban-sms-project/>.

- Urban SMS (2009). 'Collection of (policy) instruments influencing the use and protection of soil from the partners of the CENTRAL project Urban SMS', obtained on July 12, 2012 from <http://www.urban-sms.eu/fileadmin/inhalte/urbansms/pdf_files/final_results/1_Collection_of_instruments.pdf>.

- Van Kamp, I., K. Leidelmeijer, G. Marsman, A. de Hollander (2003). 'Urban environmental quality and human well-being: towards a conceptual framework and demarcation of concepts; a literature study'. *Landscape Urban Planning,* 65. p.p. 5-18.

- Van der Veen, M. & Korthals Altes, W.K. (2011). 'Urban development agreements: Do they meet guiding principles for a better deal?', *Cities,* 28. p.p. 310-319.

- Vogel, I., Claus Gerhard Bannick and Holger Boken (2004). 'The German Soil Protection Law and Regulations for the Utilisation of Biowaste', *Federal Environmental Agency of Germany,* Obtained from <http://www.soilace.com/pdf/pon2004/9.Vogel.pdf>.

- Vrščaj, Borut, Laura Poggio & Franco Ajmone Marsan (2008). 'A method for soil environmental quality evaluation for management and planning in urban areas' , Soil Monitoring and Evaluation in the Interest of Land Use, 88(2-4), p.p. 81-94 <http://www.sciencedirect.com.proxy.library.uu.nl/science/article/pii/S0169204608001333>.

- Wapner, P. (1997). “Governance in Global Civil Society” In ‘Global Governance: Drawing insights from the environmental Experience’, edited by Oran R. Young, p.p. 65-84. *Cambridge: MIT Press*.

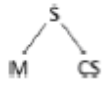
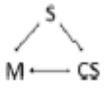
- WCED (1987). ‘Our Common Future, From One Earth to One World’, *UN Documents,* Obtained from <http://www.un-documents.net/ocf-ov.htm>.

12.1 Interviews

Case Study	Contact Person	Interview type/date
Utrecht	Marcel Herms (Gemeente Utrecht) Albert de Vries (Gemeente Utrecht) Jan Benthem (Architect) Arie van de Watering (Corio) Jeroen ter Meer (ProRail)	Formal interview on September 6, 2012 Formal interview on September 6, 2012 Formal interview on October 4, 2012 Formal interview on September 19, 2012 Formal interview on September 20, 2012
Gent	Gent Sint-Pieters info center (anonymous) Nele Verhoeven (Administration urban planning)	Formal interview on November 6, 2012 and telephone. Interview through email exchange
Stuttgart	Franziska Röhm (Öffentlichkeitsarbeit) Martin Schönbeck (DB)	Email exchange interview Email exchange interview
Lyon	Info Lyon (anonymous)	Telephone and email exchange interview

13 Appendices

13.1 Appendix 1: Governance mode characteristics (Driessen et al., 2012)

		Centralized governance	Decentralized governance	Public–private governance	Interactive governance	Self-governance
						
Actor features	**Initiating actors**	Central gov't agencies (or supranational bodies)	Gov't at its various levels of aggregation (subsidiarity)	Central gov't agencies; private sector is granted a preconditioned role also	Multiple actors: gov't, private sector and civil society	Private sector and/or civil society
	Stakeholder position	Stakeholder autonomy determined by principal agency	High likelihood of stakeholder involvement	Autonomy of market stakeholders within predetermined boundaries	Equal roles for all network partners	Self governing entities determine the involvement of other stakeholders
	Policy level	(Supra)national state	Lower levels of gov't	Local to international level	Multiple levels	Local to international level
	Power base	Coercion; authority; legitimacy (democratic representation at the national level)	Coercion; authority; legitimacy (democratic representation at lower levels)	Competitiveness (prices); contracts and legal recourse; legitimacy (agreement on relations and procedures)	Legitimacy (agreement on roles, positions, procedures and process); trust; knowledge	Autonomy; leadership; group size; social capital; legitimacy (agreement on relations and procedures)
Institutional features	**Model of representation**	Pluralist (popular (supra)national election and lobbying)	Pluralist (popular local election and lobbying)	Corporatist (formalized public–private governing arrangements)	Partnership (participatory public–private governing arrangements	Partnership (participatory private–private governing arrangements)
	Rules of interaction	Formal rules (rule of law; fixed and clear procedures)	Formal rules (rule of law; fixed and clear procedures)	Formal and informal exchange rules	Institutions in its broadest form (formal and informal rules)	Informal rules (norms; culture); self-crafted (non-imposed) formal rules
	Mechanisms of social interaction	Top down; command and control	Sub-national governments decide autonomously about collaborations within top-down determined boundaries	Private actors decide autonomously about collaborations determined boundaries	Interactive: social learning, deliberations and negotiations	Bottom up: social learning, deliberations and negotiations
Features concerning content	**Goals and targets**	Uniform goals and targets	Uniform and level specific goals and targets	Uniform goals; targets actor specific	Tailor-made and integrated goals xand targets	Tailor-made goals and targets
	Instruments	Legislation, permits, norms and standards	Public covenants and performance contracts	Incentive based instruments such as taxes and grants; performance contracts	Negotiated agreements; trading mechanisms; covenants; entitlements	Voluntary instruments; private contracts; entitlements; labelling and reporting
	Policy integration	Sectorial (policy sectors and levels separated)	Sectorial (policy sectors separated)	Sectorial (branches and industries separated)	Integrated (policy sectors and policy levels integrated)	Sectorial to integrated (depends on problem framing by communities of interest)
	Policy–science interface	Primacy of generic, expert knowledge	Primacy of generic expert knowledge; room for issue and time-and-place specific knowledge	Dominance of issue and time-and-place specific knowledge; expert and lay (producers and consumers)	Transdisciplinarity: expert and lay knowledge in networks; emphasis on integrated and time-and-place specific knowledge	Dominance of issue and time-and-place specific knowledge: expert and lay (citizens)

13.2 Appendix 2 : Actor 'Policy Integration' Questions

	Definitely occurring (on frequent basis)	Usually occurs (on a regular basis)	Sometimes occurring	Very infrequent occurrence	Not occurring at all
	5	4	3	2	1
Early communication about plans with public stakeholders (with who)					
Early communication about plans with private stakeholders (with who)					
Cooperation with private actors (elaborate on who and why/ why the score?)					
Cooperation with public actors (elaborate on who and why/ why the score?)					
Clear commitment by private actor (who?)					
Clear commitment by public actor (who?)					
Clear leadership by private actor (who)					
Clear leadership by public actor					
Maintenance of a sense of urgency of the issues, by whom?					
Encouragement for involvement in project, by whom?					

13.3 Appendix 3: Institutional 'Soil integration measures' Questions

	Definitely (occurring on frequent basis)	Usually (occurs on a regular basis)	Sometimes occurring	Very infrequent occurrence	Not occurring at all
	5	4	3	2	1
Normative Integration					
High-level political commitment for soil management					
Societal backing for soil management					
A change in policy tradition for better soil management					
Long-term time perspective for soil use (100+ years)					
Use of knowledge and science about soil					
Organizational Integration					
Accountability mechanisms for soil					

use					
Coordination and communication mechanisms about soil					
Restructuring of the budgeting process to ensure soil management					
Training and awareness programmes about soil					
Interaction with external actors about soil					
Procedural integration					
Monitoring environmental impacts of soil					
Organized consultation forums about soil					
Sector reports on environmental conditions of soil					
Consultation and participation about soil					
Decision-making rules for proper soil management					

13.4 Appendix 4: Policy Content 'Integrated Sustainable Soil Management' Questions

	Definitely (occurring on frequent basis)	Usually (occurs on a regular basis)	Sometimes occurring	Very infrequent occurrence	Not occurring at all
	5	4	3	2	1
Procedural Integration					
Is there quantification of environmental soil cost/benefits					
Is there qualitative identification of all environmental soil costs/benefits					
Is there environmental impact assessment of project on soil before implementation					
Is there strategic environmental assessment of policies and plans at different spatial scales					
Have eco-efficiency targets and indicators for soils been developed and used to monitor					

progress					
Are there environmental management measures for soil within the sector (GIS applications) and monitoring of their implementation					
Output of environmental integration					
Are all costs for soil internalized (i.e. polluter pays principle)					
Do economic instruments for sustainable soil management generate behavioural change					
Are environmentally damaging soil subsidies withdrawn					

13.5 Appendix 5: Workshop Results

Group Member	Name	Organization	Country	Main Theme	Sub-theme	Problem
1. A	Yves Duclos	Ademe	France	Actors	Self-interest/Ownership	People worry about their own property and the value of it when located in a polluted area
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Interactions	Partnering for change	Partners are needed with a stake for clean soil. Their needs can generate money to remediate the soil
11. B	Steven van Beek	University	The Netherlands	Objectives	Lack of vision	There is no bigger picture adressing land-use plans
11. B	Steven van Beek	University	The Netherlands	Interactions	Communication	There is no overview of expectations from the public and a presentation of boundaries of what is possible and what is not
11. B	Steven van Beek	University	The Netherlands	Interactions	Communication	Non sufficient overview of scenarios, inclusive of cost-benefit analysis
13. A	Bert van Goidsenhoven	OVAM	Belgium	Knowledge	NIMBY	People do not want pollution in their backyard, or remediation activities closeby
14. A	Jan Schreurs	KU Leuven	Belgium	Rules	Pollution Awareness	There are different requirements for the quality of (public) space
14. A	Jan Schreurs	KU Leuven	Belgium	Power	Social Conditions	People do not have the opportunity to move out of polluted area, constrained by their social conditions
15. B	Maarten Bettens	PMV	Belgium	Time	Time	Life expectancy is approximately 86yrs. Remedeation and groundflow projects are ever-lasting
15. B	Maarten Bettens	PMV	Belgium	Knowledge	Pollution Awareness	Pollution may not be seen as a direct threat. Pollution is too deep
18. B	Robin Desmedt	RWO-VI	Belgium	Actors	Ownership	Development is nested to the area of ownership, so no larger scale is possible
2. B	Sonja Guelton	University	France	Objectives	Importance of the problem	Struggling for basic amenities and wealth is more important than environmental concerns and decontamination of sites
2. B	Sonja Guelton	University	France	Rules	Cultural boundaries	Communication does not always take into account the socio-cultural position of people
2. B	Sonja Guelton	University	France	Interactions	Process	People express themselves on objectives but planners try to meet the needs of investors
22. B	Frank Gwildis	City of Stuttgart	Germany	Rules	Communication	Unclear steps about remediation process during redevelopment. When is the situation improved
22. B	Frank Gwildis	City of Stuttgart	Germany	Objectives	Communication	Spatial framework has to be made clear; 'Larger picture'
26. B	Carole Bionnet	Tauw FR	France	Rules	Participation	People need to participate more to find a solution, through open-ended question and answer sessions
4. B	Jan Frank Mars	Bodem+	The Netherlands	Rules	Land use not designated	Other requirements depending upon land use
4. B	Jan Frank Mars	Bodem+	The Netherlands	Objectives	No neighbourhood vision/lack of participation	There is no clear helicopter view of neighbourhood opinion about problem
4. B	Jan Frank Mars	Bodem+	The Netherlands	Knowledge	Scale of the problem/Communication	Lack of information on the Is the problem micro or macro in scale
4. B	Jan Frank Mars	Bodem+	The Netherlands	Rules	Communication/Participation	Politicians do not want the public to participate
9. A	Jasper Baas	Gemeente	The	Objectives	Vision	Start by making clear and concrete plan, then build

		Rotterdam	Netherlands			
8. B	Chris Verhoeven	Utrecht	The Netherlands	Actors	Stakeholder Analysis	Make use of stakeholder analysis before starting the process of remediation/development. This helps to implement an integrated approach
22. B	Frank Gwildis	City of Stuttgart	Germany	Resources	Costs/Scenario options	Provide an indication of costs and different scenarios
14. A	Jan Schreurs	KU Leuven	Belgium	Interactions	Research/Communication	Research design and communication options
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Resources	Communication	Communicate the cost of pollution. But also explain that clean soil does not exist. (Exceptable levels of pollution)
1. A	Yves Duclos	Ademe	France	Knowledge	Assurance	Give assurance that public action and funds will help to remediate damages
14. A	Jan Schreurs	KU Leuven	Belgium	Time	Spatial/Temporal frame	Use a spatial and temporal frame to set goals and process steps
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Time	Communication	Make clear the goals; short-term, mid-term, long-term and output
1. A	Yves Duclos	Ademe	France	Interactions	Communication/Decision	Make co-decisions to help with confidence in decision-making
14. A	Jan Schreurs	KU Leuven	Belgium	Interactions	Participation	Organize public discussions on visions, projects and interaction between both
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Interactions	Participation	Early neighbourhood participation at stage one, to help create 'own' environment
17. A	Tom Braeckman	RWO-VI	Belgium	Decisions	Communication/Design	Design a land use plan with information on restrictions on density and obligation for green areas
14. A	Jan Schreurs	KU Leuven	Belgium	Interactions	Participation	Participation as co-production; identifying, discussing and deciding
13. A	Bert van Goidsenhoven	OVAM	Belgium	Time	Demographic Change	Take into account the changing needs of people
25. A	Hans Peter Koschitzky	ITVA	Germany	Knowledge	Communication	Provide information on the risks involved with site remediation activities
13. A	Bert van Goidsenhoven	OVAM	Belgium	Objectives	Mobility	Promote plans which focus on the wider arena of sustainability
18. B	Robin Desmedt	RWO-VI	Belgium	Interactions	Communication	Public participation is necessary throughout the whole process. Not just the communication of results
8. B	Chris Verhoeven	Utrecht	The Netherlands	Knowledge	Communication	Understand the lifestyle, beliefs and culture of people before communicating. Important to know the behaviour of people to connect better
5. C	Albert de Vries	Utrecht	The Netherlands	Resources	Reward	Reward people with money or recognition for good ideas and approach
5. C	Albert de Vries	Utrecht	The Netherlands	Interactions	Communication	Organize an 'integrated department' at municipalities to deal with problem locations and redevelopment
17. A	Tom Braeckman	RWO-VI	Belgium	Knowledge	Economic means	Cheap land and cheap energy so more money to use for redevelopment
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Rules	Insurance	Insurance proposition needed for effects
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Rules	Insurance	Insurance proposition needed for effects
5. C	Albert de Vries	Utrecht	The Netherlands	Power	Organization/Communication	Organize the people better so that stakeholders and public both influence the solutions

5. C	Albert de Vries	Utrecht	The Netherlands	Decisions	Integral Plan	Planners need to look at all aspects, such as air, noise, water, energy when redevelopment plans are made
5. C	Albert de Vries	Utrecht	The Netherlands	Interactions	Integral Thinking	Integrated thinking including the public to get things done
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Rules	Law	Be creative with the adoption and adaptation of laws
19. C	Johannes Dörle	Stuttgart	Germany	Resources	Institutional support	Adequate administrative structures to support the complexity of the problem
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Resources	Funding	Public funding for environmental issues, which will create solidarity
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Resources	Funding	Funding support by private and public domains
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Knowledge	Recognition of Sustainability	Often only financial costs are considered. But other costs (environmental and social) play an important role as well
19. C	Johannes Dörle	Stuttgart	Germany	Knowledge	Certification	There is no certification standard
27. C	Ludwig Immier	Tauw DE	Germany	Objectives	Planning	There is a lack of a clear plan so costs cannot be calculated. Some sites may also be considered as historically significant
5. C	Albert de Vries	Utrecht	The Netherlands	Resources	Image	It is difficult to be sustainable and profitable
22. B	Frank Gwildis	City of Stuttgart	Germany	Interactions	Economic	Not everything is profit. Transparency is needed with regards to actual profits and costs
19. C	Johannes Dörle	Stuttgart	Germany	Decisions	Social	Development of derelict areas for improved urban quality of life rather than polluted areas
5. C	Albert de Vries	Utrecht	The Netherlands	Knowledge	Recognition of Sustainability	Recognition of the importance of all aspects of sustainability will lead to long-term profit
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Resources	Economic	Individuals do not want to participate in cost-sharing
2. B	Sonja Guelton	University	France	Resources	Economic	Direct costs and indirect costs are not linked well. The leverage of indirect costs is not considered enough for project development
27. C	Ludwig Immier	Tauw DE	Germany	Rules	Planning	Consultancy should be used to investigate, remediate and monitor a project
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Rules	Planning	It is not possible to pay for remediation without building and providing an indication of profit and benefits
27. C	Ludwig Immier	Tauw DE	Germany	Rules	Economic	Not enough costs are charged for waste, discharge of water and investigation of problems
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Knowledge	Environmental	Not enough research on eco-system services such as plants and their role on taking out pollutants and creating a healthy environment at the same time
5. C	Albert de Vries	Utrecht	The Netherlands	Knowledge	Environmental	Ground value should increase when soil is clean
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Knowledge	Economic	It is considered to be better to do something with brownfields than nothing at all because there is potential to gain profits and market value
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Decisions	Economic	Investors will look for alternative sites when costs are too high and there is a high degree of uncertainty

21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Resources	Economic	Short-term expenses are usually high and long-term profit is uncertain
3. C	Julien Michel	INERIS	France	Resources	Economic/Risks	Building new houses should help generate profits as it stimulates investment. However, risks for all involved stakeholders must be clear before development occurs
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Resources	Economic/Risks	Developing by building new houses may generate more income but is not necessarily the best long-term solution for everyone
19. C	Johannes Dörle	Stuttgart	Germany	Rules	Planning	Clear policies and framework conditions with a concise focus is missing, leading to poor planning and a degrading environment
11. B	Steven van Beek	University	The Netherlands	Interactions	Social	Combining city municipalities to avoid unsustainable competition
22. B	Frank Gwildis	City of Stuttgart	Germany	Interactions	Social	Make clear where the profits of projects come from
2. B	Sonja Guelton	University	France	Actors	Social	Ensure public participation and intervention measures
15. B	Maarten Bettens	PMV	Belgium	Objectives	Environmental	Establish the goals of remediation in an area. Provide certainty of effects
8. B	Chris Verhoeven	Utrecht	The Netherlands	Resources	Environmental	Investing in brownfields preserves the greenfields and further contamination of grounds
18. B	Robin Desmedt	RWO-VI	Belgium	Knowledge	Environmental	Communicate long-term benefits by monetizing ecosystem benefits
22. B	Frank Gwildis	City of Stuttgart	Germany	Interactions	Communication	Provide clear step by step overview of short-term and long-term costs/profits.
11. B	Steven van Beek	University	The Netherlands	Interactions	Planning	Specify the focus of the remediation
18. B	Robin Desmedt	RWO-VI	Belgium	Interactions	Economic	Develop overview of development and land ownership. Exchange land between owner and developer to create a win-win situation. Minimize speculation of land prices
2. B	Sonja Guelton	University	France	Interactions	Economic	Overview of starting costs and how to cope with those costs
25. A	Hans Peter Koschitzky	ITVA	Germany	Knowledge	Risks	Implement risk-based remediation. Remediate only as much as needed to prevent risk
15. B	Maarten Bettens	PMV	Belgium	Decisions	Finance Structure	Develop a financial structure to cover long-term remdiation costs and costs incurred by pollution plumes
5. C	Albert de Vries	Utrecht	The Netherlands	Knowledge	Certification	Create a certification tool for the development of an integrated approach
13. A	Bert van Goidsenhoven	OVAM	Belgium	Rules	Economic	Provide tax incentives for using an integrated approach
14. A	Jan Schreurs	KU Leuven	Belgium	Power	Institutional restructuring	Turn the municipality into a development agency
14. A	Jan Schreurs	KU Leuven	Belgium	Objectives	Maximize sustainability	Redevelop in such a way that environment, social and economic themes all improve
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Objectives	Maximize sustainability	Create value on all aspects and stimulate entrepreneurship
14. A	Jan Schreurs	KU Leuven	Belgium	Rules	Economic	Tax on added value of land due to remediation efforts
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Resources	Resource Mobilization	Provide resources for landowners to tackle polluted soil

7. A	Thom Maas	Bodem+	The Netherlands	Interactions	Institutional restructuring	New contracting to solve gap with stakeholders and their different agendas
1. A	Yves Duclos	Ademe	France	Decisions	Risks	Minimize risk of private actors in redevelopments by using other economic means and public funds
1. A	Yves Duclos	Ademe	France	Interactions	Economic	Public help when necessary for redevelopment, using European funds. Take into account historical data on pollution
7. A	Thom Maas	Bodem+	The Netherlands	Resources	Economic	Increase tax to help owners with polluted sites to fund remedial costs
5. C	Albert de Vries	Utrecht	The Netherlands	Resources	Economic	Cost-sharing necessary to stimulate more investments and obtain long-term profits
3. C	Julien Michel	INERIS	France	Resources	Economic	Share costs and ensure that private land-owners recognize the benefits and long-term profits of clean soil
25. A	Hans Peter Koschitzky	ITVA	Germany	Actors	Restructuring	Bring together site owners to discuss responsibilities and share costs
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Objectives	Maximize sustainability	Ensure economic, social and environmental benefits
13. A	Bert van Goidsenhoven	OVAM	Belgium	Resources	Economic/Risks	Pre-finance a site when possible to limit the risks of higher budgets for developers
1. A	Yves Duclos	Ademe	France	Decisions	Polluter Pays	Implement the polluter pays principle for any damage incurred on the site
17. A	Tom Braeckman	RWO-VI	Belgium	Power	Restructuring	Create a balance between profit, cost and time. Involve the government and private sector to decide on this
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Integration/Risks	Integrate soil remediation and development needs. Only clean up what needs to be cleaned up to prevent risks. This save money
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Scale	Introduce a bigger scale for project development, ensuring a more wholistic approach
25. A	Hans Peter Koschitzky	ITVA	Germany	Knowledge	Site Investigation	Invest more money in site investigation to get a clear picture of problems and issues. Efficiency of remediation is expected to improve
22. B	Frank Gwildis	City of Stuttgart	Germany	Actors	Institutional restructuring	Differentiate clearly the roles of the stakeholders; public, private and government
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Interactions	Planning	When pumping up groundwater remove pollutants at the same time
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Knowledge	Planning	Put polluted soil in dykes and under roads
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Interactions	Planning	Make industries plan their waste management more efficiently. When pumping up water for example make sure to clean it in the process
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Knowledge	Planning	Use bio-washing machines to reduce pollutants
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Pollution	Polluted drinking water
13. A	Bert van Goidsenhoven	OVAM	Belgium	Knowledge	Protection	Protection of drinking water and resources in general
17. A	Tom Braeckman	RWO-VI	Belgium	Knowledge	Pollution	Reduce polluted drinking water
7. A	Thom Maas	Bodem+	The Netherlands	Knowledge	Pollution	Pollution of drinking water resources

1. A	Yves Duclos	Ademe	France	Knowledge	Environment/Issue	Clearly identify the issue and the source of pollution
17. A	Tom Braeckman	RWO-VI	Belgium	Rules	Environment/Issue	Reduce groundwater usage by farmers, factories and drinking water
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Environment	Pollution spreads while building and developing on site
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Environment	Spread of pollution by groundwater flows
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Environment	Contamination of clean areas
20. A	Peter von Schnakenburg	City of Stuttgart	Germany	Resources	Protection	Prevent the spreading of contaminants
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Risks	Human risks due to pollution and evaporation of contaminants
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Risks	Air pollution due to contaminants
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Environment	All pollution should be remediated
15. B	Maarten Bettens	PMV	Belgium	Resources	Economic	Uncertainty about the cost of green and nature. How much will individuals contribute to it
20. A	Peter von Schnakenburg	City of Stuttgart	Germany	Knowledge	Risks	Remediation will prevent health risks for humans
7. A	Thom Maas	Bodem+	The Netherlands	Objectives	Energy	Energy resources are wasted
14. A	Jan Schreurs	KU Leuven	Belgium	Knowledge	Energy	Energy resources from the ground are reduced
17. A	Tom Braeckman	RWO-VI	Belgium	Knowledge	Energy	Potential energy to be gained from ground is limited
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Complexity	Unknown effects of pollution
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Complexity	Analysis of pollution is hard
9. A	Jasper Baas	Gemeente Rotterdam	The Netherlands	Knowledge	Complexity	Complexity of problem as different types of pollution are mixed
14. A	Jan Schreurs	KU Leuven	Belgium	Rules	Environment/Research	Lack of monitoring and lack of relevant indicators
1. A	Yves Duclos	Ademe	France	Objectives	Environment	Lack of long-term vision and goals for projects and development
20. A	Peter von Schnakenburg	City of Stuttgart	Germany	Decisions	Landuse	Contaminated land should be re-used instead of building on greenfield sites
13. A	Bert van Goidsenhoven	OVAM	Belgium	Power	Landuse	Pressure to develop quickly on greenfield sites
7. A	Thom Maas	Bodem+	The Netherlands	Decisions	Landuse/Economic	Development of greenfield sites is cheaper than developing on brownfield sites
14. A	Jan Schreurs	KU Leuven	Belgium	Actors	Demographics	Population density restricts space and when not used efficiently reduces the quality of life

17. A	Tom Braeckman	RWO-VI	Belgium	Time	Landuse	Contaminated sites may be historically and culturally relevant (monuments and archeology)
14. A	Jan Schreurs	KU Leuven	Belgium	Time	Environment	Climate change leads to more pollution and uncertainty
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Actors	Individualistic	Specialists set their own agendas, focusing on (profits?)
14. A	Jan Schreurs	KU Leuven	Belgium	Actors	Individualistic	Individualistic versus common pool perspective
17. A	Tom Braeckman	RWO-VI	Belgium	Knowledge	Landuse	Land elevation and other factors may effect the level of pollution
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Alternative scenarios	Obtain drinking water from other sources such as surface water
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Alternative scenarios	Clean drinking water at the receiver
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Knowledge	Alternative scenarios	Using surface water will reduce the impacts on the water table and sources of contamination
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Rules	Law/Policy	Create laws that do not deter people implementing from sustainable initiatives
5. C	Albert de Vries	Utrecht	The Netherlands	Rules	Law/Policy	Understand that the planet and subsurface is a common good and should therefore have a big influence on plans and projects
5. C	Albert de Vries	Utrecht	The Netherlands	Knowledge	Awareness	Create awareness of positive combination of development that will improve the quality of life
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Actors	Integration	Involve important stakeholders as shareholders who want to invest time, money, knowledge and network in an area
7. A	Thom Maas	Bodem+	The Netherlands	Rules	Law/Policy	Enforce stricter European laws. Doing nothing is no option
27. C	Ludwig Immier	Tauw DE	Germany	Rules	Law/Policy	Reduce the complex nature of environmentla laws
17. A	Tom Braeckman	RWO-VI	Belgium	Objectives	Landuse	Encourage green areas in development sites to reduce soil pollution
17. A	Tom Braeckman	RWO-VI	Belgium	Objectives	Landuse	Change designated land-uses to prevent pollution
25. A	Hans Peter Koschitzky	ITVA	Germany	Decisions	Landuse	Use the site as is, managing the contamination and maybe implementing restoration in the future
17. A	Tom Braeckman	RWO-VI	Belgium	Rules	Landuse	Develop licenses and codes for construction
17. A	Tom Braeckman	RWO-VI	Belgium	Rules	Landuse	Remediation of inundation
25. A	Hans Peter Koschitzky	ITVA	Germany	Knowledge	Research/Risks	Investigate the source, pathway and receptor of pollution. This will help to better determine risks and appropriate actions
27. C	Ludwig Immier	Tauw DE	Germany	Knowledge	Research	Develop new techniques to ensure clean soil. New groundwater treatment techniques
27. C	Ludwig Immier	Tauw DE	Germany	Rules	Monitoring	Better and longer monitoring of sites
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Decisions	Economic	Stop thinking of building and redevelopment as solution. Start thinking of ways to use areas effectively and efficiently 'operating' an area to make money

5. C	Albert de Vries	Utrecht	The Netherlands	Knowledge	Research/technology	Remediate only in a sustainable way, especially important for the long-term
6. A	Marcel Herms	Utrecht	The Netherlands	Interactions	Technology	Combine remediation with energy recouperation
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Knowledge	Technology	Make use of every resource in the soil (energy, resource, CO2 storage, biodiversity, valuable wate, valuable sediments) and exploit these to pay for remediation costs
25. A	Hans Peter Koschitzky	ITVA	Germany	Knowledge	Technology	Use eco-efficient remediation technologies
3. C	Julien Michel	INERIS	France	Knowledge	Research/technology	Use green techniques
20. A	Peter von Schnakenburg	City of Stuttgart	Germany	Knowledge	Research/technology	Use 'energy-saving' remediation techniques
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Objectives	Landuse	Limit the area where building and development can take place so that people are forced to re-use grounds and are more apt to clean the ground
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Rules	Economic	The polluter must pay for the remediation costs
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Decisions	Policy	Set priorities. Soil pollution may not be the most serious problem
10. C	Jurgen van de Heijen	AT Osborne	The Netherlands	Decisions	Policy	Mix solutions to solving problems
5. C	Albert de Vries	Utrecht	The Netherlands	Objectives	Policy	Design a policy that encourages an integrated approach for the subsurface
21. C	Hermann J. Kirchholtes	City of Stuttgart	Germany	Objectives	Policy	Protect greenfields
6. A	Marcel Herms	Utrecht	The Netherlands	Rules	Monitoring	Stop spreading pollution
6. A	Marcel Herms	Utrecht	The Netherlands	Rules	Monitoring	Do not pollute clean areas
5. C	Albert de Vries	Utrecht	The Netherlands	Objectives	Economic	Protect clean groundwater resources because they are of much value
16. C	An Spitaels	Provincie Overijssel	The Netherlands	Decisions	Restructuring	Stop the current industrial system and go back to hunter-gatherer society
6. A	Marcel Herms	Utrecht	The Netherlands	Rules	Law/Policy	Remediate ALL pollution
15. B	Maarten Bettens	PMV	Belgium	Knowledge	Awareness	Generate awareness to reduce waste, traffic, herbicides, insecticides and other spills
5. C	Albert de Vries	Utrecht	The Netherlands	Decisions	Landuse	When redeveloping always include plans for green and local food space
19. C	Johannes Dörle	Stuttgart	Germany	Decisions	Landuse	Find appropriate landuses for contaminated sites
19. C	Johannes Dörle	Stuttgart	Germany	Resources	Economic/Environment	Consideration of all environmental costs. Monetize as best as possible
8. B	Chris Verhoeven	Utrecht	The Netherlands	Knowledge	Landuse	Differentiate the level of ground so as to make a good decision. (A=healthy but expensive, E= not healthy but cheap)
11. B	Steven van	University	The	Rules	Monitoring	Monitor and evaluate effects on a constant basis

	Beek		Netherlands			
5. C	Albert de Vries	Utrecht	The Netherlands	Actors	Management	Decide on an overall manager who takes care of implementing an integrated approach
3. C	Julien Michel	INERIS	France	Rules	Environment	Design new building codes
14. A	Jan Schreurs	KU Leuven	Belgium	Interactions	Awareness/Communication	Share scenarios with future contexts, and how to communicate these with different stakeholders
22. B	Frank Gwildis	City of Stuttgart	Germany	Interactions	Communication	Develop a communication process for remediation and redevelopment making sure to list pro's and con's
11. B	Steven van Beek	University	The Netherlands	Interactions	Management	Find common worldviews and language to solve the problem
11. B	Steven van Beek	University	The Netherlands	Rules	Environment	Determine acceptable levels of pollution
22. B	Frank Gwildis	City of Stuttgart	Germany	Rules	Environment	Need to discuss and agree about acceptable levels of pollution
22. B	Frank Gwildis	City of Stuttgart	Germany	Knowledge	Environment	Small is beautiful. Make sure that people understand that every little bit helps
2. B	Sonja Guelton	University	France	Resources	Environment	Develop more recycling and production alternative. Even small initiatives will help
2. B	Sonja Guelton	University	France	Resources	Economic/Environment	Increase taxes for using and building on greenfields. Use this money for remediation and deter greenfield development
26. B	Carole Bionnet	Tauw FR	France	Knowledge	Economic/Awareness	Promote smart consumption
18. B	Robin Desmedt	RWO-VI	Belgium	Decisions	Landuse	Treat every development project individually. Not every project has the same issues
8. B	Chris Verhoeven	Utrecht	The Netherlands	Resources	Monitoring/Management	Use multi Criteria Analysis and Social cost-benefit analysis and EIA during early stages and throughout project development
11. B	Steven van Beek	Tauw	The Netherlands	Knowledge	Landuse	Promote creative use of underground space through the provision of incentives
2. B	Sonja Guelton	University	France	Interactions	Management	Coordinate sustainable soil management beyond regional and national policy to the international and global arena
18. B	Robin Desmedt	RWO-VI	Belgium	Objectives	Management	Start with the goal of using an integrated approach to tackle the issues at stake
6. A	Marcel Herms	Utrecht	The Netherlands	Knowledge	Research	Increase scientific research
22. B	Frank Gwildis	City of Stuttgart	Germany	Decisions	Management	Look for options to apply an integrated approach
2. B	Sonja Guelton	University	France	Knowledge	Management/Planning	Work on urban planning
2. B	Sonja Guelton	University	France	Knowledge	Research	Promote innovation for use of underground for industry in order to preserve the upper soil layer
26. B	Carole Bionnet	Tauw FR	France	Interactions	Awareness/Communication	Share information on environmental and social costs and impacts