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Integrated Project
Global Change and Ecosystems

D6.1.2a Report on Institutional Mapping in SWITCH Cities.

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D6.1.2 Report on Institutional Mapping (IM) in SWITCH Cities

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D6.1.2 Report on Institutional Mapping in SWITCH Cities

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SWITCH Deliverable Briefing Note
D6.1.2 Report on Institutional Mapping in SWITCH Cities
<p>Audience</p> <p>The document was prepared for an audience both inside and outside the SWITCH consortium. It is for researchers and others involved with innovation in urban water management. It aims to encourage them to think more strategically about how their ideas or plans for innovation research might be taken up by key stakeholders. This includes identification of any significant institutional barriers to uptake and ideas for removal of such barriers.</p>
<p>Purpose</p> <p>The purpose of the document is to provide a frank summary of the project’s experience with developing and implementing methodologies for mapping the range of institutional arrangements governing the management of water in the participating cities. This includes first- hand accounts of the usefulness of both the process and end results of the institutional mapping exercises undertaken. The reports on various cities provide examples of a range of outputs from a variety of approaches to implementing the concept of institutional mapping.</p>
<p>Background</p> <p>The concept of institutional mapping was part of the project design, under Work Package 6.1. Colin Green of Middlesex University spear-headed the elaboration of a conceptual framework for institutional mapping, and also applied this framework to Birmingham, one of the SWITCH cities.</p>
<p>Issues</p> <p>The main developmental problem identified at project inception related to delivering integration through a fragmented mosaic of institutions. The context was fragmented decision making on water management issues, limited stakeholder engagement in resolving water governance challenges, conflicting policies, and in some cases, weak engagement by municipal authorities in the planning and regulation of water related services. Tools were needed to understand the water governance context and support key stakeholders involved in innovation and managing the change to engage in constructive dialogue to address the challenges faced relating to integration and sustainability. Various tools were introduced by the SWITCH project to address this issue (see recommendation 3 below).</p>
<p>Recommendations</p> <ol style="list-style-type: none"> 1. A serious effort to understand water governance, through institutional mapping exercises undertaken in the earlier stages, should be part of any initiative to improve the integration of urban water management and innovation. 2. The tools used and developed in the SWITCH project to map and improve understanding of urban water governance can be used and adapted by researchers and others to inform their planning and implementation activities. 3. A team or person responsible for an institutional mapping exercise should have the required experience, qualitative research skills and local knowledge,

- 4.** For greater impact, institutional mapping should be an inter-disciplinary and participatory exercise, rather being undertaken as a separate specialist study within a multi-disciplinary team.

D6.1.2 Report on Institutional Mapping (IM) in SWITCH Cities

Introduction to Institutional Mapping

This report introduces the concept of institutional mapping (IM) as incorporated in the project design and summarises SWITCH experiences with IM in various participating cities. It starts by explaining how institutional mapping fits with other activities in the project design. The terms institutions and “institutional mapping” are elaborated in the context of the project’s overall aim of Integrated Urban Water Management (IUWM). Aspects of a “methodology” and “protocol” for institutional mapping are developed by Colin Green are described, prior to a summary of how institutional mapping was undertaken in the participating cities. The report documents the various benefits from activities related to IM in the cities, as identified by some of the key project players (i.e. Learning Alliance facilitators, city coordinators and lead researchers) in SWITCH cities. Some key principles and lessons derived from the projects experience with IM are identified. Examples of reports arising from IM activities are provided as annexes to the report.

How Institutional Mapping linked with other Project Activities

At the project design stage, SWITCH Work Package 6.1 “Governance for integrated urban water management” was intended to input into the wider aim of promoting IUWM in the participating cities. The project document stated “Since decision-making is a cross-cutting issue, WP6.1 will be.. especially related to Theme 1 the paradigm shift but also to Themes 2,3,4, and 5 related to different water sectors (SWITCH, 2006, p259). In the first year of the project, concepts and analytical frameworks relating to governance and the aim of promoting IUWM were developed by Colin Green in his review of the theory and practice of good governance (Green, 2007). Institutional mapping was the second step within WP6.1 in a planned process of developing and testing a framework and tools for communicating and engaging with stakeholders in the participating cities. The next step in the plan was to establish a theoretical basis to support an equitable process of multi-stakeholder engagement around the IUWM agenda (Green, 2009). The end point was to develop, through stakeholder engagement, an IUWM agenda for each city, including demonstrations of new water management technology and longer term plans for a more sustainable and integrated urban water management system.

While IM was a specific methodology to be developed under WP6.1, in the project design it was practically and conceptually linked to activities in other work packages (Table 1). The intention was that IM would build on the initial scoping study and stakeholder analysis activities undertaken under WP6.2 in the first year to support the formation of a city learning alliance focused on IUWM. The results from IM in a particular city would support its learning alliance to identify more clearly how innovations being considered could be implemented and scaled up. Under WP6.3

Social inclusion case studies in Accra, Alexandria and Belo Horizonte would provide insights into opportunities for empowering marginalised groups to contribute to the IUWM agenda.

Studies of institutional arrangements for financing and cost recovery under WP6.4 would provide a basis to strengthen the mapping of barriers and opportunities for innovation through demonstration projects. Under WP2.2, mapping of current decision making and power relations in relation to storm water management would link to and strengthen the more generic mapping of water governance in cities. Under WP1.3 mapping of existing infrastructure and systems for water management would link with the IM of decision making in relation to potential areas for technical innovation, including adaptation of existing infrastructure.

Table 1: Overview of Project Activities Linking with Institutional Mapping

WORK PACKAGE	ACTIVITY/DELIVERABLE	LINK TO IM
6.2 Learning Alliance formation	D2- Scoping & Scoping Report for each city- D5 Stakeholder analysis & Institutional analysis –	Identify key institutions, boundaries and issues/opportunities, Identify key actors to join city learning alliance & vertical linkages
6.1 Water Governance	D2 Institutional Maps of Cities	Elaborate above as per the methodology, with stakeholder input.
6.3 Social Inclusion	D1 Baseline reports on demonstration project areas (Accra, Alexandria) D2 Case Studies on inclusive approaches (Belo-Horizonte)	Data on access to, use of and control over services by vulnerable and marginal groups. Participatory budgeting includes marginal communities in water related decision making
6.4 Financing, cost recovery and institutional models	D6.3.4 Study of institutional arrangements to obtain finance and ensure cost recovery for demo projects	Mapping of institutional arrangements for financing innovation in urban water management.
WP 2.2 Decision making processes for effective Storm Water Management	D2.2.3a&b Report outlining current decision making processes and Institutional Map of power and funding for storm water management	Mapping of power, decision making and opportunities for stakeholder engagement relating to storm-water management within participating cities.
WP 1.3 Integration of existing infrastructure	D1.3.1 Report on integration with existing systems.	Mapping of infra-structure integration that can link to institutional mapping when considering innovations

Institutions and IUWM

Colin Green (2007) defines institutions as “systems of rules”, and explains that these rules, both formal or informal, define the boundaries of an institution. For the purposes of water management, institutions are also likely to be organisations. In other words an organisation is the physical embodiment of an institution. In the context of IUWM, the most relevant organisations will either have a recognised service or regulatory role in water management (such as a water supply company or a water board), or will be able to clearly articulate their

interest in water management (such as a water user association). Such organisations are recognised to have power and/or influence in relation to water management.

Who has the power to act, or the power to require their agreement before another can act, depends upon the context, including which aspect of water management is being considered. Institutions, including their boundaries, are shaped by their historical, geographical and technical contexts. For example if the focus is mainly on the governance of urban sanitation, as was the case with the IM work done in the SWITCH cities in Latin America (Smits et al, 2009), then the mapping will more fully cover organisations with a clear role in this aspect of water management.

The boundaries for different forms of service delivery relating to water differ spatially as well as in relation to the water cycle to include areas outside of the city boundaries. For example national organisations formulating policies on water management, or catchment based boards regulating use of water, may be based outside of the city boundaries but hold power and make decisions which impact greatly on how water is managed within a particular city. This aspect of how institutions at different levels relate to urban water governance informed the conceptual framework used in the analysis of governance relating to sanitation in SWITCH cities located in Latin America.

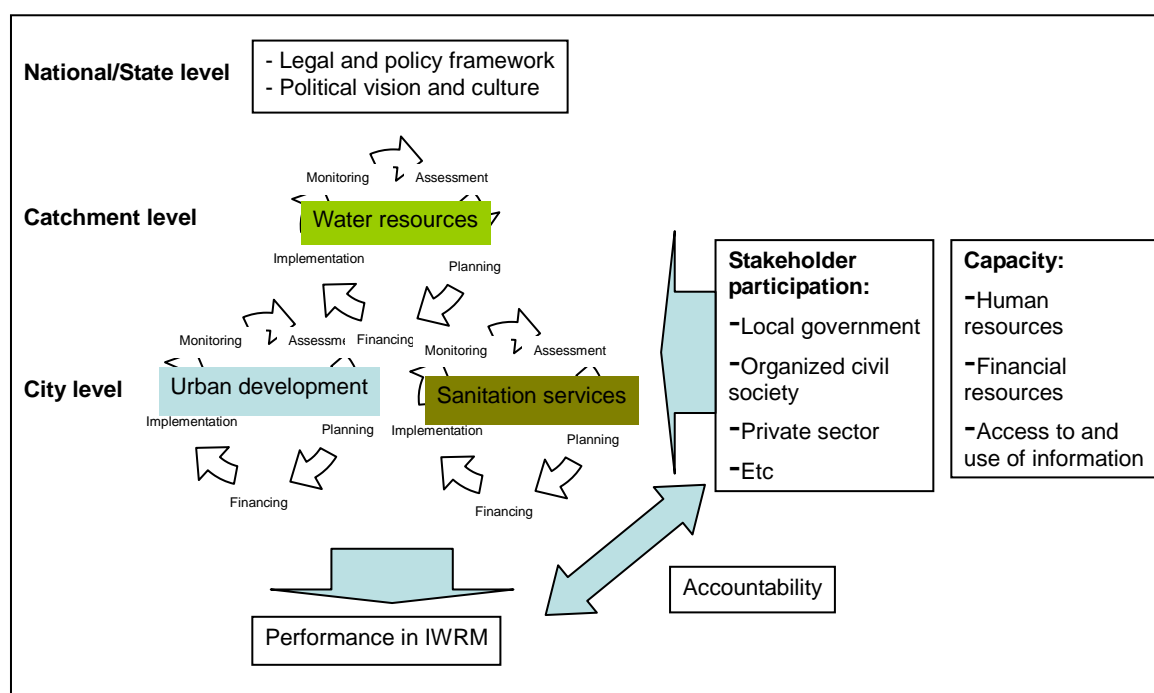


Figure 1: Conceptual framework for Analysis of Governance Relating to Sanitation Services in Latin America (from Smits et al 2009)

How can mapping contribute to IUWM?

SWITCH has aimed to deliver more integrated urban water management through a fragmented mosaic of institutions in the context of a 5 year action-research project. In the context of mapping institutional arrangements, the mapping exercise is useful in situations wherever some form of change or innovation is being contemplated or proposed. Smits et al (2006), in this context differentiate between “full” or “institutional” integrated water resource

management (IWRM) on the one hand and “light” IWRM on the other. This is in recognition that delivering comprehensive integration of water management will involve the design of new institutions to suit the physical boundaries of the systems to be managed, which is a long-term and ambitious goal. On the other hand, modest improvements may be possible by improving the cooperation or co-ordination of existing institutions. Some form of institutional mapping provides a starting point for either approach.

Institutional mapping in SWITCH cities was seen as a necessary for gaining adequate insight into the existing institutional and governance structures for urban water management, prior to and as part of considering what changes could be made. The underlying assumption was that while more integrated UWM may require new technologies (including planning and management tools and models), it can only be delivered through the relevant institutions and key stakeholders involved.

By identifying where funding and powers reside, for each proposed intervention strategy and technological solution, institutional mapping aims to provides key insights needed for developing realistic plans.

In most cases, achieving the desired change in technical aspects of water cycle management within a city would almost certainly require to changes in the way that existing institutions work, and how the stakeholders perceive each other. Mapping the existing (formal and informal) power and influence exercised by the relevant institutions, particularly that pertaining to a new technical innovation being considered, was regarded as a key element of the SWITCH approach to facilitating change in the participating cities.

Institutional Mapping can also be a step in exploring space for institutional reform, and organisational change, which may or may not be linked to infrastructural changes. It should provide insight into the relations between stakeholders including those formally and informally involved in service provision and the users of the services. An institutional map will provide clarity on the articulation of users’ needs and on decision making processes, issues related to governance and the opportunities and constraints to achieving integrated urban water management.

What is institutional mapping?

Institutional mapping links technologies and issues around IUWM with governance processes, structures and outcomes of decision-making. Mapping defines stakeholders and the different kinds of power they hold and exercise. It also examines their sources of funding, because this shapes how power is exercised and the types of incentives that may either limit or encourage innovations that are being proposed. An institutional map will identify which institutions have the power to deliver, fund or otherwise influence the successful up-take of technical measures in order to deliver sustainable urban water management in a particular city. It focuses on the key actors, their interactions, where power is located, who has the ability to influence decisions, and who makes decisions.

Depending on the stage in the process of innovation, mapping may include particular detail of the internal functioning of a key organisation; its “intra-organisational rules”. These partition what an organisation can do into three sets: what it must do, what it may do, and what it must not do. Intra-organisational rules (or the constitution) define specifically what an

organisation can do, and/or the objectives it is to pursue and often the procedures it should adopt.

From a service delivery perspective, three different categories groups of stakeholders are identified in Figure 2. Institutional mapping focuses particularly on the stakeholders with power and funding to implement, because without them achieving any measure of change will be almost impossible. Those with information and knowledge, including the researchers and consultants on the SWITCH project, have a key role in providing the inputs needed to design and evaluate any agreed innovations. Stakeholders who are affected by an innovation in water management have an interest in it, but their ability to influence the innovation and be engaged in the innovation process will usually be limited. Action research, through a project like SWITCH provides a framework for bringing together these three categories of stakeholders. The city Learning Alliances developed under WP6.2 were intended to provide a platform for the three categories of stakeholder to engage with each other around the IUWM agenda.

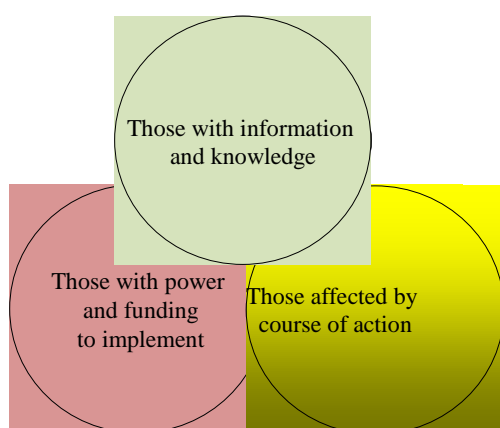


Figure 1 Stakeholders in service delivery (from Green, 2007)

Key issues to understand in institutional mapping

An assumption behind institutional mappings is that while power may be unequally distributed between institutions and stakeholders, power is also fragmented to the extent that no individual organisation can deliver a service alone. As the case studies from Latin America illustrate (Smits, et al 2009), urban governance has been (and still is) changing in the direction of widening participation. Technical sectors such as water management are not excluded from this trend.

In such a context the effectiveness of any organisation lies in its ability both to influence others and to work effectively with others to address a shared problem or opportunity. The powers and funding to deliver integrated water management may be scattered between different institutions. It is therefore necessary to map out the functional and geographical boundaries and know where the powers and funding to deliver different courses of action reside in a specific city. City institutional maps will identify what institution has which duties and powers, and its funding to do what it has to do, or is empowered to do.

As noted earlier (Figure 1) city level decision-making, and operational decision-making at the sub-city level, often is fundamentally influenced and affected by decision-making at regional

and national levels. The analysis of institutional arrangements which leads to the construction of an institutional map therefore needs to consider each of these levels or layers; the institutional map is multi-layered.

Methodology for IM

Institutional mapping is an emerging approach in the field of action-research which is not “set in concrete”. Some examples from other sectors include mapping value chains and policies linked to small-scale agricultural producers in Pakistan and the Philipnes, (Ramay, 2007; Digal et al, 2007), mapping poverty and environmental linkages in Malawi (Jere, 2008), mapping capacity for engagement in an action-research on climate change and adaptation in East Africa (Kituyi, 2008) and mapping national innovation systems (Orstavik & Nas, 1997). These and similar reports suggest that institutional mapping is not a blue-print methodology, but a useful analytical tool that can be applied through a variety of methods, ranging from literature reviews and questionnaire surveys on the one hand to participatory stakeholder workshops on the other.

The SWITCH methodology for IM was developed by Colin Green of Middlesex University and a “protocol” for this was tested out in Birmingham, the second largest city in the UK. This methodology was been developed and demonstrated in *‘Institutional arrangements and mapping for the governance of sustainable urban water management technologies; Mapping protocol’* by Colin Green of Middlesex University (Green, et al 2007). Following a request from the Lodz learning alliance coordinator, who planned to undertake institutional mapping in Lodz, Colin Green prepared a generic Terms of Reference for institutional mapping, to supplement the protocol and IM report for Birmingham (See Appendix 1 of this report).

The IM methodology and protocol was not fully replicated in the other participating cities. The concepts and some of the methods were applied in a modified format. Variation between SWITCH cities in how IM was implemented, and some of the reasons for this variation is described in the next section of this report.

Colin Green identifies four groups of tools for institutional mapping of water management as:

- Mapping formal definitions of key terms, such as river, sewer etc (these are found in law and administration)
- Diagrams showing relationships between the involved organisations
- Diagrams showing technologies
- A series of questions covering different possible relationships

Institutional mapping is fundamentally an iterative process of data collection and analysis. Having identified the relationships between the organisations, and the organisations who are consequently players, the remaining questions are:

- What are the objectives and/or interests of those organisations?
- What rules govern their behaviour, including the procedures which they must adopt in making and implementing decisions?

The main elements of an institutional map

The main elements of the protocol developed by Colin Green for institutional mapping are:

1. Specification of the institutional map creator(s) and who is/are institutional map user(s), and the technologies concerned.
2. Clear determination of the purpose of the institutional mapping, including what kind of behavioural changes are required.
3. Specification of the primary, secondary and further ‘action spaces’ likely to be relevant to the purpose determined and a preliminary identification of how they interact.
4. Identifying the main players at different levels.
5. Selection of sequencing in which institutional layer mapping is to be presented in the institutional map.
6. Decide whether the institutional mapping is likely to be different, and therefore presented differently, for each sustainable urban water management technology.
7. What are the ‘rules of the game?’ i.e. the legislative and regulatory environment including the international level; regulations, guidance, guidelines, codes, administrative procedures, financial arrangements and administrative procedures.
8. The informal ‘rules of the game’ – the underlying social norms and conditions
9. Assessment of compliance: how far the formal rules operate in practice?
10. The internal rules of the key organisations mapped.
11. Definitions to lend clarity and precision to the institutional analysis and mapping. A glossary of terms should be provided.
12. Relevant background data and information to place the institutional mapping into a wider context. (e.g. population size of city, country, Per capita water consumption, Trends, Agency or organisation ownership etc.)
13. Employ a range of methods of presentation and portrayal in order to make the mapping clearer to the reader.

Implementing IM in SWITCH cities

This section summarises the scope of institutional mapping exercises undertaken in the SWITCH cities. The project design included the objective “to prepare institutional, governmental and social organisational maps for each case study city, indentifying where powers and funding reside, and potential barriers, for each possible intervention strategy (SWITCH, 2006, p259).

When it came to implementing IM, various factors hampered the full integration or effective linking of governance research, including institutional mapping, with the other research.

Factors Limiting and Shaping IM implementation

1. EU requirements for research project formulation implied de facto identification of “interventions” (i.e. research and in some cases demonstrations) at the project design stage, rather than in the second year of implementation. Because of these requirements, the use of governance research and institutional mapping results to assist a “demand-led” research process; selecting from a range of “possible interventions” for a particular city was often of marginal importance because the main interventions had already been identified.
2. The large size of the project research team, , and its geographical and institutional dispersal, while providing a large “bank” of expertise, made the task of coordinating an effective inter-disciplinary research effort very difficult. Hence at the early stage there was limited effort to manage the integration of governance research, including institutional mapping, with other project research and demonstration activities.
3. Progress with preparation of institutional maps for each city was hampered by other factors including:-
 - EU funding rules which made it difficult for some researchers with the appropriate expertise to participate in institutional mapping in some participating cities (because their institutions did not have the matching funds for these cities).
 - there were not enough researchers in the project consortium with sufficient experience and availability to implement the intention of undertaking IM at a early stage of the project,
 - The methodology and written guidance for IM was developed in the first year, and so not available at the start of the project. Moreover, after IM protocol was developed, there was no training activity related to IM in the project work plan and no clear incentivised process for mentoring inexperienced researchers wishing to undertake IM in their cities.
 - The allocation of project budgets under WP6.1 to consortium members implicitly concentrated governance research in some cities (i.e. Belo Horizonte, Alexandria and Birmingham) and pledged inputs to some other cities by Europe based partners already working in these cities (i.e. Beijing, Cali, Lima and Accra). Lodz and Tel Aviv did not have budgets for IM. The partner with a budget to cover Hamburg and Zaragossa identified a researcher for this task early in 2009, but he left before the work could progress further

Fourthly factors which influenced the extent and manner of institutional mapping in each participating city were:-

- The history of previous governance research by locally based research partners. For example in Latin America (Belo Horizonte in particular but also in Cali and Lima) researchers had been working on aspects of urban water governance prior to the start of the project and so it was easier in such a context to further build on this existing base and use the concepts and methods they had already developed. In Accra an experienced consultant was hired and was able to use their prior knowledge and research into water governance.
- The size and complexity of the city in relation to the planned intervention. For example in Hamburg the intervention was focused on a small part of the city (Wilhelmsburg Island) and in Beijing and Lima on a specific sub-sector niche (urban agriculture), and so the mapping of institutions could focus more on a particular area or sub-sector,
- The extent to which the leading researchers in the participating cities were already championing innovations and engaging with key city stakeholders. In Cali, Tel Aviv, Belo Horizonte, Lodz and Birmingham there was a history of such engagement at project design stage. The planned interventions were informed by a knowledge of the existing institutional arrangements. A more formal institutional mapping exercise provided a basis to further consolidate and elaborate this knowledge, develop existing relationships, and in most cases to inform the up-scaling of innovations already being championed through the projects demonstration activities.
- Inputs from European based partners based outside of the cities into studies undertaken during the first year of the project provided key information for institutional mapping in several cities. This included the scoping studies in Accra, Alexandria, Hamburg and Tel Aviv; stakeholder analysis in Accra and Lodz, social inclusion case studies in Accra and Alexandria and financial governance studies in Belo-Horizonte and Beijing.

City approaches to implementing IM

The factors described above contributed to each participating city implementing institutional mapping somewhat differently. Some of these differences in implementation are summarised below on a city by city basis. This provides a backdrop for the identification of benefits and lessons relating to IM in the following section.

Accra

In Accra an initial scoping study undertaken in September 2006 identified: the main players in the urban water sector; their mandates, roles and activities, and the problems and opportunities identified by them relating to achieving more integrated water management. In early 2007, a learning alliance facilitator was identified and trained and went on to conduct a stakeholder analysis which build on the scoping study and provided the basis for

establishment of the city learning alliance. The learning alliance began to explore issues relating to IUWM, discuss possible demonstration projects and develop a vision for the future of IUWM in Accra. A social inclusion baseline study was undertaken and a community selected for demonstration activities.

By this stage the protocol for institutional mapping based on Birmingham had been produced and informed the planning for institutional mapping in Accra. The plan content largely followed the recommended protocol. The main modification was a strong emphasis on stakeholder participation in the process of institutional mapping, and subsequent activities designed to build stakeholder ownership of the results of the mapping exercise. Three focal areas for institutional mapping within the Accra's water sector were identified in the IM plan; 1) strategic planning for IUWM, 2) uptake of urban agriculture and 3) uptake of approaches for inclusion of water users and particularly the poor in IUWM.

When it came to implementation, it was felt that the local research partners did not have all the available expertise to undertake a full IM exercise. KNUST sub-contracted a local expert with extensive knowledge and experience in the sector to lead the IM exercise. Through further discussion an annotated bibliography relating to IUWM was an added output for the IM exercise.

The intention was to complete the mapping exercise by mid 2008, but the exercise was delayed due to competing demands on the time of the local expert and difficulties in gaining access to some of the required documents and key informants. To progress the IM work, the city learning alliance facilitator became actively involved and eventually took the leading role in the IM data collection, analysis and report writing. This involvement was helpful in terms of both engaging stakeholders in the IM process and also linking IM with the process of developing consensus within the city learning alliance on the need for strategy for IUWM. A draft report on IM was produced in late 2008 and a final report in 2010 (Darteh, et al, 2010). As part of stakeholder engagement and influencing national policy, there was a formal presentation of results from the IM exercise to policy makers and stakeholders at a city learning alliance meeting in 2010. The information from the IM exercise, together with information gathered through the RIDA analysis and other data gathered in relation to the strategic planning process, was incorporated into a strategic document published in March 2011 "Towards integrated urban water management in the Greater Accra Metropolitan Area" (Adank et al, 2011). This document sets out a clear the strategic direction for IUWM in Accra. It incorporates the three areas of focus agreed in 2007 for the IM exercise; strategic planning, urban agriculture and social inclusion, and also includes the bibliography of water resources in Accra.

Alexandria

In Alexandria a similar steps were followed to Accra. In Alexandria as in Accra, rather than being a stand alone activity, IM was part of a set of activities, centering around the city

learning alliance, which contributed to the promotion and demonstration of aspects of IUWM in the city.

A scoping visit was undertaken in late 2006 and a report produced which identified the main players in the urban water sector, their mandates, some key problems and opportunities identified by them relating to achieving more integrated water management. In 2007, a stakeholder analysis was undertaken and a draft report prepared which was helpful for identifying who should be involved in the city learning alliance. The baseline study undertaken under the social inclusion work package informed the design of the demonstration in Alexandria, which included extending access to water and sanitation services to one of the marginal areas of the city with the input from key stakeholders within the learning alliance.

A difference from Accra was that after the stakeholder analysis, the designated learning alliance facilitator for Alexandria changed, so there was less continuity between the stakeholder analysis and the institutional mapping. In Alexandria as in Accra, there was a strong link between the IM exercise and strategic planning with the development of a strategic plan for IUWM in the city. Shortly after the stakeholder analysis was completed, a more in-depth IM exercise was initiated (AbuZeid & Elrawady, 2010). This involved a series of visits and communications to various organisations during 2008 which extended into 2009. As in Accra, this was linked with the process of gathering data for the strategic plan. Alexandria has a very long history of developing institutions to manage water, and the task of documenting the many layers of institutional involvement was formidable. Challenges in getting hold of all the relevant information and getting access to the key people for the institutional mapping was not easy and often required extended negotiations. While these challenges were initially experienced as frustrations by the team leading the IM exercise, through the negotiations a situation developed whereby various organisations holding the information took on a more active role in documenting and helping to analyse the information. This process helped to build ownership of the information produced and the overall aim of addressing aspects of IUWM in the city.

Birmingham

In Birmingham institutional mapping took a somewhat different course from Accra and Alexandria. As the main research and demonstration priorities for the city were agreed as part of the project design, an initial scoping exercise was not undertaken in order to identify these priorities. As in Accra and Alexandria, the stakeholder analysis was undertaken to inform the development of the city learning alliance, particularly which organisations to be approached and invited to participate in the learning alliance meetings. As in Accra, the city learning alliance facilitator took on the task of stakeholder mapping. Once the city learning alliance was formed in 2007, and the existing research plans shared, additional opportunities for innovation were explored by the members. An early outcome from this was a study into the provision of utilities, including water related services, in Eastside, an area undergoing regeneration. In the context of a city where water services are provided and regulated by organisations based outside of the city boundaries, this study provided an effective way not

only of deepening the analysis of institutional and sustainability issues relating to utilities provision, but also of engaging city authorities, planners and developers in discussions on the IUWM agenda for the city.

In contrast with Accra and Alexandria, the learning alliance facilitator was not involved in the IM study for Birmingham. A comprehensive IM exercise for Birmingham was undertaken by Colin Green and colleagues from the University of Middlesex in order to demonstrate the IM concept. The IM for Birmingham took place in parallel with the Eastside Utilities Study. It included a section on Eastside, but most importantly provided a clear working example of how institutional analysis could be used to progress thinking about the barriers and incentives relating to a range of IUWM innovations relevant to the city, including water demand management, sustainable urban drainage systems, water recycling and wastewater management.

This analysis highlighted the importance, for Birmingham, of mapping the major influence of national institutional arrangements on urban water management. Further detailed mapping of the institutional arrangements influencing the uptake of SUDS was undertaken by other researchers from Middlesex University together with city stakeholders in Eastside during 2008 and 2009 (Ellis and Revitt, 2011). This exercise concluded that institutional issues, including aspects of the urban planning process, rather than the availability of technology, was the main barrier. The analysis of institutional barriers to the uptake of SUDS in Birmingham informed the framing of new national legislation and policies on flood management, demonstrating the value of IM not only for guiding stakeholder engagement within a city, but also for influencing national policy.

Cities in Latin America

The approach to institutional mapping in the three Latin American cities identified for this exercise in the SWITCH project design; Belo Horizonte, Cali and Lima, was somewhat different. One researcher, Stef Smits, was involved in all three cities, enabling a comparative analysis of governance arrangements and issues across the three SWITCH cities and one other (Smits et al 2009). The comparative analysis included:-

- Review of global and regional literature on governance and urban environmental sanitation.
- Case studies in four cities to come up with empirical findings on current governance arrangements around sanitation,
- Cross-case analysis, focused on analyzing trends, similarities and differences across the cases, in order to distil lessons learnt.

In each city, data collection followed a similar pattern, including a review of secondary information, semi-structured interviews with 10-15 key stakeholders, including officials from different units within the local authority, the utility company, State or national level government departments, civil society organisations, and community representatives. Analysis

of these interviews was done by the SWITCH city teams. The main focus in data collection and analysis was on governance of the urban sanitation sector (including flood-water control), based on the regional literature review which identified this as a key area for improving integration of water management.

A contrast with Accra, Alexandria and Birmingham was that in Latin America, all three SWITCH cities had researchers from the local universities fully involved in the institutional mapping. Moreover, these researchers had a history of engagement with aspects of research relating to local urban development and water management prior to the start of SWITCH. While the challenge of access to key information experienced in Alexandria and Accra was also experienced in Cali and Lima, the existing relationships provided a strong basis for mapping key aspects of water governance and also for stakeholder engagement around the key issues relating to improved IUWM. Local research capacity was supplemented by inputs from European partners in Belo Horizonte and to a lesser extent in Cali and Lima also.

Belo Horizonte

A scoping visit was undertaken in June 2006 with the aim of supporting establishment of a city learning alliance. In Belo Horizonte the local research team had a strong social science capacity. This is reflected in the number and quality of studies relating to institutional mapping undertaken in the first year of the project, including; 1) stakeholder analysis, 2) analysis of governance of water supply and sanitation, 3) study of the reform of financing arrangements in the water and sanitation sector, 4) institutional mapping around flood management (Smits et al 2008b). Involvement of the Municipal Authority (SUDECAP) as a project partner was a distinctive feature that enabled a practical link between the governance analysis and local area engagement on issues relating to flood management, with an emphasis on local capacity building for influencing decision-making with a view to scaling up local capacity across the city (Smits et al, 2008c). In contrast with Accra and Alexandria, the institutional mapping studies were not so important for the establishment of a city learning alliance, perhaps because the learning alliance facilitator for Belo Horizonte was not so involved in the studies of governance at city levels and above. While the learning alliance established at community level was strong, using institutional mapping and analysis as a basis for a strong stakeholder engagement at city and beyond the municipal area was a challenge in Belo Horizonte.

Cali

There was no initial scoping visit to Cali, because originally Cali was not identified as a demonstration city. In Cali the leader of the research team of sanitation engineers had a long history of engagement with local stakeholders on environmental and sustainability issues and understood the importance of understanding the institutional landscape for promoting the uptake of technical innovation for improved IUWM. Following the decision to make Cali a demonstration city in early 2008, a stakeholder analysis was undertaken, along with a diagnostic study of the institutional framework for water management and an institutional mapping focusing on the governance of sanitation (Smits et al, 2008d). In Cali the city coordinator played a strong role in facilitating the city learning alliance and was involved in the institutional analysis. This provided a strong basis for efforts focused on bringing the

institutional mapping findings into the process of engaging city stakeholders in the development of a strategic plan for IUWM in the city, including minimising of waste-water pollution and opportunities for innovation in the use of water saving technology in new development areas in this expanding city.

Lima

As in Cali, there was no initial scoping visit because originally Lima was not identified as a demonstration city. In Lima the research team had social science capacity and an existing research focus on social ecology. Following the decision to make Lima a demonstration city and establish a learning alliance in Lima, learning alliance training and institutional analysis was undertaken by the local research team with support from IRC (Smits et al, 2008a). The University of Hamburg looked into opportunities for promoting Ecosanitation in the informal settlements around the city and identified institutional constraints which were analysed in depth. A specific piece of institutional analysis; a review of the legal framework on the re-use of wastewater in Peru was undertaken with a view to drafting a new policy on this more favourable to water re-use of waste water for agriculture and other economic uses. The subsequent primary focus was on the demonstration and out-scaling of urban agriculture and related water-saving technology in the city.

Institutional Mapping in other SWITCH Cities

Beijing

In Beijing the local research team had experienced social science capacity and also support from experienced researchers in IHE and ETC. The technical focus in this very large, complex and rapidly developing urban context was on grey water recycling and rain water harvesting for urban agriculture. While the technical focus in the city was agreed at an early stage, this was set in the context of broad based institutional mapping of the governance of main aspects of water and sanitation services was undertaken through literature review and key informant interviews in the first two years of the project (van Dijk & Liang 2009). The results of analysis of the formal institutional mechanisms raised many questions. Moreover gathering data and analysis of the informal institutional processes was particularly challenging given the sheer number of potential stakeholders and also the cultural sensitivities about discussing informal processes in formal settings. In spite of these challenges, more specific institutional analysis of the institutions involved in the three demonstrations (grey water reuse, grey water recycling and rain-water harvesting) was undertaken. This institutional mapping was complemented by economic cost-benefit analysis of the technologies being demonstrated.

Hamburg

In Hamburg the research team had strong social science capacity, and was able to build on a legacy of stakeholder engagement. A further factor enabling the effective use of institutional mapping was the involvement of the municipal planning authorities as a partner in the project.

The stakeholder analysis was undertaken in the first year and followed up by the institutional mapping which was completed in 2009 with a shorter English version completed in 2011 (Lagenbach et al, 2009 and 2011). The main focus of institutional mapping in Hamburg was on rain water management, flood protection, and a multi-stakeholder platform on management of the River Elbe Estuary. The overall planning process focused on the demonstration of water sensitive urban design as part of participatory planning for the urban regeneration of the Wilhelmsburg Island area of the city.

Lodz

In Lodz the initial scoping study was followed by stakeholder analysis and the findings from this level of mapping institutional arrangements shaped the stakeholder engagement process through the city learning alliance. The Learning Alliance facilitator was involved in the stakeholder mapping and was keen to further deepen this institutional analysis, presenting ideas for this at the February 2009 workshop on Institutional Mapping. She developed plans for a more in-depth institutional mapping and terms of reference were drawn up with the aim of inputs from Coling Green based in the UK. The study did not proceed due to sickness, budgetary limitations and difficulty in identifying a suitable local researcher to join the study team. However, through the process of the learning alliance key stakeholders came to the table, listened to each other and focused on shared problems and opportunities facing the city. This process enabled an informal discussion some of the “rules of the game”, and a mutual understanding of the norms and values of the key organisation, and supported stakeholders to agree what improvements they could make through the existing governance arrangements (Wagner et al, 2009).

Tel Aviv

In Tel Aviv, as in Lodz, the local research team lacked the social science capacity for undertaking institutional mapping. The initial scoping study in late July 2006 mapped out the main institutions involved in aspects of water governance. This initial map was further developed, indirectly and informally, through the process of training and support in strategic planning and the development of demonstration projects for the city. A plan to further develop the draft institutional mapping for the city during 2009 was shelved after the identified researcher was no longer available. However, a workshop on strategic planning, the development of sustainability indicators and the planning of a number of demonstration projects provided a less formal basis for mapping some key institutional roles and relationships.

Zaragosa

Zaragosa was identified as a demonstration city and a scoping visit was undertaken in June 2006. However for various reasons a city learning alliance was not formed and the research and demonstration activities were very limited compared to other cities. In preparation for potential activities, a draft literature based institutional mapping exercise was undertaken during late 2008 (Brinquis, 2009). This analysis did not link with the work undertaken on

demand management which used other tools to gather data on aspects of the water governance arrangements in the city.

Benefits from the IM experience

The main objective for institutional mapping, as set out in Colin Green's case example of IM for Birmingham, is mapping the distribution of power the formal and informal rules governing decision-making in the governance of water. The expected benefits from institutional mapping include an improved understanding of water governance. It is assumed that such an understanding is necessary for exploring, through action research, opportunities to improve urban water management in particular cities or locations. In this context institutional mapping is a necessary input for identify more or less favourable conditions for introduction of a new water management technology or innovation. A working assumption is that because power relations and institutional arrangements cannot easily be "engineered" to enable a particular technology to be promoted and adopted, it is necessary when considering technical innovation to understand the important power relations and institutional arrangements.

Institutional mapping, as described and demonstrated in Colin Green's analysis for IUWM in Birmingham and applied in the participating cities, more specifically focuses on identifying opportunities for innovation in urban water management. In the context of an action-research approach, it aims to assist with the identification of barriers and opportunities for improving the sustainability and integration of urban water management in a particular context.

Institutional mapping in the participating cities was expected to provide adequate insight into the existing institutional and governance structures for urban water management, supporting and guiding the consideration of what kinds of improvements (or innovations) might be made, the potential scope of these improvements and who might be involved in negotiating and working them out.

The SWITCH project thus provides an opportunity to assess to what extent the expected benefits from IM were realised in the participating cities, and if other (less expected or "side") benefits were realised.

An email consultation with some SWITCH city research coordinators and learning alliance facilitators at the end of the project explored their perceptions of the benefits of institutional mapping for the participating cities. The project actors were asked about their perceptions of the benefits from stakeholder analysis and institutional mapping.

The views expressed suggest that, in varying measures, the intended benefits of the institutional mapping, broadly defined to include the stakeholder analysis and city scoping exercises, were achieved in most, but not all of the participating cities. Some other benefits also noted.

The main benefits mentioned by project actors can be summarised under the following sub-headings;

- improved understanding of the key institutions,
- Identification of stakeholder interests,
- stakeholder identification and engagement,
- communication and developing relations with stakeholders
- development of information networks,

Some of the views of projects actors are presented below under these sub-headings.

Improved understanding of the key institutions.

Some form of improved insight or understanding was a widely cited benefit. This reflects the recognised need, in the context of the aim of IUWM, to have this understanding not just for academic reasons, but to inform future plans and communications.

Bertha Darteh, the Accra LA facilitator summed this up as *“Knowing the stakeholders; a) understanding the mandates and rules, control and influence, b) what is their interest? and c) understanding individual and institutional values.”*

A somewhat different view on the benefit of improved understanding was expressed by Nilo Nascimento, the city coordinator for Belo Horizonte *“for us at the university, the institutional mapping process contributed to develop a more detailed and deeper view of the water governance in different government and territorial bases: the municipality, the metropolitan area, the river basin, the state and the federal spheres. This process contributed, then, to evolve an analytical and critical approach on water governance that is now present in the thesis and papers produced here under SWITCH.”*

Alberto Galvis, the city coordinator for Cali noted that *“mapping allowed us to better understand the formal and informal relations between institutions and their relations with institutions that require their services. This included understanding the formal framework including decrees, laws, norms, etc., that influence the functions and jurisdiction areas of the institutions”*.

For Hamburg the first LA facilitator, Jochen Eckart, emphasised the strategic value of IM in that it *“could help us to understand the relationship between the stakeholders (the existing partnerships, conflicts) so that it is possible to fit the strategy to the local conditions”*.

With regarding to developing understanding, Phil Sharp, the first city coordinator for Birmingham, who also visited and worked in a number of participating cities felt that the stakeholder analysis and institutional mapping outputs had been particularly useful because *“in many cases it was probably the first time anyone had actually sat down and tried to actually map out not only the “official” arrangements and stakeholders but also the “informal” connections and players. These were fascinating and very useful to the*

understanding of how things worked and who needed to be involved and approached on various matters. In Birmingham where things were much more structured and clear let's say these exercises were not so incisive. They really mapped out what we more or less already knew."

Discussion of stakeholder interests, building ownership and ideas for innovation

While the main aim of IM is to document and understand the current water governance situation prior to an intervention, interviewing stakeholders can develop into a more sustained dialogue with stakeholders and what they would like to see changing.

Bertha Darteh noted that for Accra *"an early stakeholder analysis makes it possible to understand better what stakeholders really want, how they could be engaged. It is also a process of creating ownership"*.

Nilo Nascimento observed that in Belo Horizonte, *"successive presentations of the institutional mapping issues in different LA meetings and the two training courses offered in August 2007 .. enlarged the understanding of the governance of water in Belo Horizonte among LA participants and provided feedback for the process of institutional mapping itself"*.

A thorough institutional mapping was not undertaken in Tel Aviv, but stakeholder dialogue built up through the initial scoping study and the Water Club meetings did provide a basis for stakeholders to put forward their interests and ideas. Haim Cikurel explained *"I can say that part of the ideas like the "Green House", "Grey Water treatment" and "Flood water treatment" projects were brought to our Water Club by the stakeholders themselves, and we helped them push the different projects by having meetings with the related government agencies or municipal or other (university in case of the Green House) institutions to convince them to perform the different projects."*

Stakeholder identification and initial engagement.

While improved understanding was the main stated aim of IM, its value for stakeholder identification and engagement was the most commonly mentioned benefit by the project actors. Various levels of institutional mapping activities, ranging from in-depth studies at one end of the continuum, to initial scoping visits at the other, provided a valued basis for stakeholder identification and initial engagement.

Nilo Nascimento, city coordinator for Belo Horizonte where a number of in-depth institutional mapping studies were undertaken noted *"first of all, it contributed in the identification of key stakeholders and in the engagement process with the city learning alliance. For at least one year after the beginning of SWITCH activities, the learning alliance in Belo Horizonte was still essentially integrated by people from the municipality and the university. When the decision of enlarging LA participation was finally built by the two partners, in the beginning of 2007, the institutional mapping contributed to enlarge the view of both partners on the stakeholders that would be involved and willing to participate."*

Alberto Galvis the city coordinator for Cali noted a benefit was to identify the main institutions and their level of influence, including *“local (Cali city) institutions intervening in the study area. These institutions interact directly in the management of water resources in the city. In this stakeholder group are: associations; municipal and local administration; environmental authority, public services companies; foundations; consultants; educational institutions, urban developers, community organizations, other authorities (regional level) like regional environmental agencies in the Upper Cauca River Basin (CVC, CRC) and the national environmental authorities like Ministry of the Environment, Housing and Territorial Development.”*

Bertha Darteh the Accra city learning alliance facilitator emphasised value of IM for *“knowing the stakeholders”* and for *“dealing with stakeholders”* and their respective levels of influence. Dealing with stakeholders included *“targeting stakeholders. For example SWITCH was at city level and IM helped to us to understand what we can do at different levels. At the city level where we could contribute in terms of medium term development plans etc. and if we needed to make policy input then our stakeholders should be at national level.”*

Phil Sharp the first city coordinator for Birmingham felt that *“the Stakeholder Mapping was relatively useful as it made us look outside of the “usual suspects” in terms on stakeholders in water management in the city.”* Phil went on to note *“I also feel that it provided a basic picture of the water management scene in Birmingham that was useful to look at every now and again in order to see how well the balance was or wasn’t and to encourage involvement from others. What we never managed to achieve was a “balanced” LA by which I mean one that wasn’t really populated by middle-level/senior managers from the various institutions that acted as key players in the Water Management of the City. i.e. Severn Trent, the EA and Birmingham City Council.”*

The first LA facilitator for Hamburg, Jochen Ekhardt, noted *“concerning the Institutional Mapping and Stakeholder Analysis I think both types of analysis are key to formalize the stakeholder engagement process and give the process a better foundation. It could help to guarantee that all different stakeholders groups are considered (e.g. the question of social inclusion) as well as that no group is missed unintentionally.”*

In Tel Aviv, the initial scoping visit was the mapping activity upon which other forms of stakeholder engagement were built. The city coordinators explained *“During the initial scoping report for Tel-Aviv (30 July-3 August, 2006) we had very good interactions with different city stakeholders due to previous acquaintance with most of them in the context of professional meetings or briefings. The objective of this report was to provide a basis for establishment of city L.A. in Tel-Aviv. Also at a later stage the interviews with LA members (TA Water Club) helped even further to enhance the cooperation.”*

Communication and developing relations with stakeholders

In cases where the learning alliance facilitator and/or city coordinator were involved in the institutional mapping, then they saw this as useful in terms of developing relationships with stakeholders, planning future communications with them and identifying key resource people.

Bertha Darteh noted that in Accra the institutional mapping aided “*communication with stakeholders*” and helped to address questions like “*what should the message be and how should it be packaged? and what are the platforms where these messages can be shared?*”. She further elaborated, “*through the stakeholder analysis and the mapping of their constraints and views, I met with a lot of stakeholders. The process of interviewing helps you with understanding what is happening and you develop relationships with the stakeholders (some kind of bonding) and stakeholders feel valued. It builds your network. The information will help you to deal with other stakeholders and people gave tips off the record as well.*”

Nilo Nascimento, city coordinator for Belo Horizonte pointed to the value in developing a relationship and shared understanding between the researchers and the municipality; “*institutional mapping contributed to the discussions between the municipality and the university on water governance issues in Belo Horizonte. This included people directly involved in the SWITCH project and LA activities from both institutions and has not been a debate involving large parts of both institutions. However, the process of mapping contributed to formalise these exchanges and to go deeper in the analytical process and identification of barriers for integrated urban water management in the city*”.

In Hamburg the mapping helped to identify the entry point into an existing network for stakeholder consultation. Jochen Eckart explained “In the first step it was a rough screening of the landscape in Wilhelmsburg. In the screening we realized that there was already a profound citizen engagement process on Wilhelmsburg which had been working for 10 years....hence we contacted the coordinator of this stakeholder engagement process and used his experiences to map the stakeholder landscape on Wilhelmsburg and try to identify the key stakeholders for IUWM. Through this based the development of the local LA on the experiences of a local expert. He was particularly helpful when identifying relevant citizen groups, making contact with ethnic minority communities and also local farmers for dialogue - a kind of door opener to get in touch with many stakeholders in Wilhelmsburg.”

Alberto Galvis noted how in Cali the institutional mapping and stakeholder engagement drew the project research team into other relevant activities; “*the SWITCH project team also became involved with relevant participatory processes for the city and the region, including: i) preparing a national policy document (CONPES) for the recuperation of water quality in Upper Basin Cauca River; and ii) completing what was called Strategic Diagnosis in the first phase of the project titled Cali Vision 2036 (500 anniversary of Cali City) with the Municipality of Cali*”.

Building information networks, a platform for dissemination and influence,

In two cities where the leading technical researchers were also involved in the institutional mapping, its for developing a useful network for future activities, including dissemination, was also emphasised.

Nilo Nascimento observed that in Belo Horizonte *“the institutional mapping process involved a lot of contacts and interviews with different stakeholders and those contacts were also relevant for disseminating SWITCH activities in Belo Horizonte and to motivate people to get involved and to participate in the LA activities. These contacts were later relevant for the two assessment of the SWITCH project in Belo Horizonte and for the development of other activities, as in the case of the interviews developed under WP 2.2 on stormwater management.*

Alberto Galvis pointed to the activities which followed on from the participatory process of institutional mapping in Cali. *“The SWITCH project team also became involved with relevant participatory processes for the city and the region. These processes included: i) preparing a national policy document (CONPES) for the recuperation of water quality in Upper Basin Cauca River, and ii) completing what was called Strategic Diagnosis in the first phase of the project titled Cali Vision 2036 (500 anniversary of Cali City) with the Municipality of Cali. It has been working scaling up, by extending the LA to new groups of stakeholders, around specific themes and the active participation in formal planning procedures and the dissemination and engagement with decision-makers. Through the SWITCH Project Univalle participated in the review of the Territorial Ordinance Plan to the Cali City. These processes have the financial resources for investments in the short, medium and long term. The inter-institutional working group formed under the SWITCH project has continued working and will participate formally in some of these processes”.*

Lessons from SWITCH Institutional Mapping

The protocol for IM (Green et al, 2008, p7) identifies a list of lessons for IM. These are derived from the Birmingham exercise and wider experience. These lessons are been further developed into 1) some key principles and 2) some general lessons based also on the analysis of subsequent experiences reported from the SWITCH cities.

Some key principles for institutional mapping?

Some key principles for IM derived from the SWITCH project experience are not unique to IM. Many also apply to other similar types of qualitative research undertaken in the context of change management initiatives or projects.

Balanced information: Information gathering should use existing studies and official documentation as well as a range of other primary and secondary sources, supplemented and verified by empirical evidence.

Cultural understanding: Comprehensive institutional mapping is time intensive, requires proficiency in the local language and an awareness of local cultural and operating practices.

Stakeholder participation Institutional mapping should involve key local stakeholders, such as those involved in multi-stakeholder bodies (like the local Learning Alliances in SWITCH).

Their involvement should ideally be more providing information and extend to participation in the analysis of information and commenting on any analysis by the main researcher.

Attention to Informal Rules: Because it is easier to identify the formal systems of rules, expressed in laws and regulations, than the informal systems of rules there is a risk that not enough attention will be given to informal rules. Social norms and informal rules of the game may be equally or more important than formal rules in terms of understanding power relations and decision-making.

Attention to Timing: In the context of technical innovation, institutional mapping should be undertaken as part of planning or designing a technical intervention or identifying potential options for water related innovations, rather than as an afterthought or an add-on activity.

Progressive Focus Depending on the direction of the innovation being considered, further information gathering will usually be needed as part of an ongoing planning and review process. This may require involving new stakeholders on board to assist with gathering and analysing information.

Managing information & confidentiality: It may be difficult to get access to some key information, particularly the informal rules, either because such information may be sensitive or because those holding the information are fearful how it might be used. Agreement with key stakeholders about confidentiality, and their participation in decisions about what information should be shared with whom is important in terms of developing trust and achieving a progressive focus in the analysis.

Developing trust: particularly when there are sensitivities around sharing information, and a history of conflict or mistrust between institutions, gaining access to key information may hinge on developing the trust of key stakeholders. When trust is developed then this provides a basis for developing a platform for stakeholder engagement and achieving progressive focus.

Dynamic perspective: Analysis should incorporate the dynamic aspects - Policy and practice are constantly in a state of change so it is necessary to see what changes are being contemplated. For example the innovatory demonstrations undertaken in Cali, Lima, Beijing and Lodz were based on analysis of dynamics going on within and around these cities, which made it possible to promote the uptake of certain technologies.

History is important. Prevailing concerns and technologies from the past are reflected in definitions of terms, in laws, regulations and institutions. This underpins the importance not only of having clear definitions for local terms used in water management, but understanding the history behind how these terms came into use.

Some Lessons

What are lessons to date from doing institutional mapping in the participating cities? Some of the lessons below are illustrated through comments from project actors. These lessons are not presented in any particular order of priority,

It is important that experienced local researchers are involved in both for the planning and for implementation of IM. Except for the three cities participating from Latin America, the SWITCH cities largely depended on expertise from outside for the institutional mapping. The lack of local researcher involvement negatively impacted both on the extent and quality of the institutional mapping undertaken, and also on the use of the institutional maps in subsequent activities. In Birmingham, a very high quality mapping report was produced by experienced researchers familiar with the UK situation. However, because the researchers were not regular members of the city learning alliance team, a high quality IM report had limited impact on the other work. Phil Sharp, the first learning alliance facilitator noted *“the Institutional Mapping exercise was done more or less single handed and we were late in realising that this had actually been done. We did try and say this should be a useful document in terms of being able to show how the various institutions interacted or didn’t as the case maybe and also that there should have been some written objective behind doing this really excellent piece of work. We imagined that there would be a workshop planned at the City level and across a number of SWITCH Cities and some form of analysis of the institutional arrangements ..and thought being given to alternative models or integrated arrangement to promote IUWM ..what needed to be changed to allow IUWM to be realised in the City.*

Effectively integrating IM analysis with consideration of technical interventions is key, otherwise the benefits of quality IM may not be felt. There is a risk that an excellent institutional analysis is not sufficient on its own for promoting IUWM in a city. The results of such an analysis need to be tabled and discussed by stakeholders, as was reported above for Belo Horizonte, Cali and Accra. Phil Sharp noted that because sharing the results of the Birmingham institutional mapping with the city learning alliance *“never really happened for various reasons in my opinion this was a lost opportunity. Particularly as this was really the missing link in the Birmingham Water Landscape – it was aspects of Governance and Institutional gaps and Urban Planning that was affecting future better water management more than a pond or a SUD’s device and the like”.*

Value can be added by using a participatory approach to undertaking institutional mapping. When stakeholders are involved in the institutional mapping, either by giving feedback as was the case in Belo Horizonte, or in gathering some of the data as was the case in Alexandria, then not only is the information more useful and empirically grounded, but there is ownership of the institutional maps by the stakeholders who participated. This makes it easier to engage the same stakeholders in any follow-on activities or initiatives because they understand how the information in these institutional maps is being used to shape these activities.

IM should be part of an inter-disciplinary action-research effort, rather than a single disciplinary activity undertaken as part of a larger multi-disciplinary effort. This lesson was noted particularly in the case of Zaragoza, where research into demand management was being undertaken but the researchers involved were not aware of the IM that had been done. Sam Kayaga, one of the researchers interviewed at the end of the project and wrote *“as I mentioned in an interview with you, we really had issues with communicating with stakeholders in Zaragoza (i.e. due to language). We therefore had to limit our work to technical field studies, through our research student, who did not interact with many other stakeholders, apart from those in Infrastructure Department. We did some institutional*

aspects earlier in the study, where we looked at partnerships for integrated water demand management; even then, we really did not use IM tools for our analysis. At the time I was not aware of the institutional mapping study you referred to.”

Mapping contributed to, but did not define, who participated in the city learning alliance.

Comments from the cities undertaking institutional mapping noted that it was mainly the scoping and stakeholder analysis that shaped the learning alliance membership, rather than the more detailed institutional mapping. In Hamburg the first city learning alliance facilitator Jochen Eckart pointed out *“we did not used the institutional analysis to shape our learning alliance as most contacts with the different agencies were already established before the institutional mapping was finalised.* This affirms the project design which included the scoping visits and stakeholder analysis in the learning alliance work package.

Phil Sharp noted that mapping helped with the monitoring of who participated in the Birmingham city learning alliance *“in Birmingham that was useful to look at every now and again in order to see how well the balance was or wasn’t and to encourage involvement form others. What we never managed to achieve was a “balanced” LA by which I mean one that wasn’t really populated by middle-level/senior managers from the various institutions that acted as key players in the Water Management of the City. i.e. Severn Trent, the EA and Birmingham City Council. We never really managed top m move beyond these people to other, lesser mortals such as the Neighbourhood Flood Groups, Parks & Leisure, Nature Groups (BSPB, Worcestershire Wildlife) or even people such as Angling Associations or other community Groups”.*

In Tel Aviv, where full institutional mapping and stakeholder analysis was not done, only the initial scoping visit study was undertaken, the planning of demonstrations was important for enlarging participation in the Water Club. Haim Cikurel observed *“when we performed the initial mapping we did not include all final Water Club members. After comprehending the importance of stakeholder involvement in the different Demo studies we added more members related to the following innovations in IUWM: a) the improved SAT project in Shafdan, b) the Green House project, where an energy and water saving, self sufficient ecological building was suggested to the Tel-Aviv University, c) the Yarkon River Rehabilitation Project and d) the Flood Water Treatment during winter time by a biofilter system in-situ these new Water Club members were actively involved and guided us in performing the different Demo studies”.*

Focusing on mapping formal institutions is not enough on its own, focus on informal institutions is needed.

Alberto Galvis, when asked to comment on the relative importance of formal and informal institutions, noted *“about the formal and informal, I think both are important. Trying to make a paradigm shift from the formal only may not be as desirable in developing countries. Our countries have thought that changing the regulations to the water resource sector will improve the situation. Clearly, this vision has failed. In the Cali case, the work done in SWITCH, has contributed since the combine formal and informal focus has generated a participatory workspace”*

Missed opportunities for bench-marking institutions across cities as a basis for transitioning?

Reflecting further on the potential use of stakeholder analysis and institutional mapping Phil Sharp noted *“To my mind it was something that was essential for Transitioning as these (i.e.*

stakeholder and institutional maps) were the starting points for each city in their transition for where they are now to where they need to be in 2050. We could have also shown by clustering each SWITCH City, where they are now and how the institutions needed to evolve to become a Water Sensitive City of the future if you see what I mean. We gathered a lot of useful information in these documents but I am not sure that we ever really got to grips with why we did it. Having said that of course it had to be done in order to initiate the LA's as not knowing who did what would not have made a good starting point really but I always felt there was so much more we could have done by way of compression and benchmarking across our cities, etc."

The need and opportunity for bench-marking across cities as a basis for interested cities to learn from others was recognised in the re-formulation of deliverables in Work Package 6.1. The combined deliverable 6.1.5/6, "Enabling Factors for IUWM" addresses this need through a conceptual framework and case studies (link <http://www.switch.watsan.net/page/3858>)

Initial institutional maps are not the only source of important information on institutions, and feedback is important. Nilo Nascimento noted that in Belo Horizonte the institutional mapping studies conducted in the first year were not *"the only source of information, since the process of stakeholder involvement included also a lot of internal discussion, contacts and interviews, but it gave an important contribution in this process"*. He continued, *"After, successive presentations of the institutional mapping issues in different LA meetings and SWITCH training activities (e.g.: during one of the two training courses offered in August 2007) allowed to enlarge the understanding of the governance of water in Belo Horizonte among LA participants and to provide feedback for the process of institutional mapping itself."*

Capacity and time for effective action is likely to be less than the opportunities identified in a comprehensive institutional map. In Belo Horizonte and Birmingham, two cities where the IM exercise was undertaken in greater depth and breadth, many of the opportunities and issues identified were beyond the project's capacity. For example in Belo-Horizonte the project team chose to focus more on up-scaling approaches for building local capacity for flood management, than focus on the upstream and city, catchment and national institutional issues which were also identified in the institutional mapping. To some extent this was a reflection of the capacity available in the project team.

There is no simple "cookbook" for IM The SWITCH experience illustrates that even though a protocol was provided for guidance, quite different approaches were used for institutional mapping in each city. There were reasons for the modifications made. It is important that experienced researchers are available both for the planning and for implementation of formal IM, because it is very unlikely that a good quality analysis can be undertaken following a manual or cookbook approach. IM requires good general qualitative research skills and experience, as well as a good knowledge of the sub-sector being mapped.

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Appendix 1: TOR for Institutional Mapping

Background

This “Terms of Reference” for institutional mapping was written by Colin Green in 2009, shortly after the SWITCH workshop on Water Governance held in Delft in February 2009. Followed the internal publication of the extensive Institutional Mapping Protocol for Birmingham in 2007, this document was written in response to requests for a shorter document which would set out a framework to guide project researchers to undertake institutional mapping in their cities. As such it complements the IM protocol, summarising some key points about the rationale for IM and also giving added guidance on defining technology and further examples of what might be included in city’s institutional map.

TOR for Institutional Mapping

Colin Green, Flood Hazards Research Centre, Middlesex University.

March 2009

Aim

To establish the institutional arrangements necessary for the effective adoption and diffusion of the innovations associated with sustainable urban water management.

Objectives

- To establish which organisations have what powers, with regard to a particular technology over the life cycle of that technology, over what other organisations, groups or individuals, in which geographical areas.
- To identify where there are gaps, overlaps and ambiguities in regard to those powers.
- To determine how effective are those powers in inducing the desired behavioural changes in other organisations, groups or individuals.
- To identify what incentives those organisations have to use those powers and what disincentives.
- To identify what incentives or barriers there are to those organisations either cooperating or collaborating.

Purposes

- To determine which organisations are required to act if the technology in question is to be adopted and which therefore are stakeholders.
- To determine what are the institutional arrangements required for the adoption and rapid uptake of the specific technology in the individual Learning Alliance City.
- To provide transferable lessons for other cities as to the institutional arrangements most likely to be successful in the particular context of that other city.
-

Context

Under the old water paradigm, organisations were created to build and operate physical systems such as a reservoir and water distribution system, a sewerage network, and so on.

It was their capacity to design, build and operate such systems successfully that was important. To be successful, they had to have the physical power to act and to do so effectively.

There are two major differences with the new paradigm:

1. no single organisation has the capacity to implement any technology on its own.
2. most of the technologies involve the adoption of that technology by a large and diffuse group of users: land owners and occupiers in the case, for example, of demand management and SUDS.

Institutional Mapping is the necessary first step to the establishing how adoption can take place.

Some definitions:

Institution: an institution is any set of formal (e.g. regulations) or informal (e.g. customs) rules that govern the behaviour of some defined group. Institutions are abstractions which determine what can happen practically.

Rule: defines one or more of what must be done, what may be done, and what may not be done, by whom. A rule does not need to be formally expressed; it can be an implicit expectation. For example, cultures are sets of rules, most of which are not expressed formally. Similarly, a couple may have a 'rule'; don't talk to me until I have had a cup of coffee. It is implicit and certainly not written down. Rules can be set internally (e.g. a social club will have rules) or externally, notably by legislation, civil or international law. It is a necessary characteristic of rules that they create boundaries, most obviously geographically but also functional boundaries. Those boundaries delimit what can be done by whom and where, and are a critical aspect of Institutional Mapping.

Organisation: an organisation is a group of people established to carry out some common purpose or purposes. All organisations are also institutions although not all institutions are manifested as organisations. The rules are what define the organisation of people; without rules they are not organised. The rules define the roles, what each does, and relationships of the different people involved. The law is the most obvious institution but is not a single organisation; instead, there are legal professions, courts, and so forth all of which are organisations. Any market is an institution; a stockmarket or town market is also an organisation.

Power: is any ability to change or influence the physical world (physical power), the self, or others (social power). Therefore, anything which is successful in influencing one of these three is a form of power and there are consequently many different forms of power. Anyone who thinks that a two year old child does not have power just because they are physically weak and have no money has obviously never had one. The forms of power, and therefore who has it, are manifold and hence those who have it can include religious authorities, ethnic leaders and NGOS. The power to influence covers a range from 'must', 'encouraged' through 'discouraged' to 'must not'. Power also varies in terms of the range over which it operates, that which or whom can be influenced thereby, and its effectiveness; how successful it is in influencing the target. Merely because one body does apparently have a power over another does not mean it actually happens.

Incentive: a form of rule which promotes or discourages some form of action by some organisation or individual, and thus is a form of power.

Cooperation: individuals, households, groups or organisations getting together to provide themselves with a single service or project. The most obvious and relevant example are the Water User Associations which provide such services as water supply, drainage or irrigation in many areas. It may also include such cooperations of organisations as the verbande in Germany and the syndicates in France where municipalities group together to provide a single service such as water supply, sanitation or flood defence.

Collaboration: individuals, households, groups or organisations getting together to provide themselves with a number of different services or projects. The historical municipality was an example.

Coordination: a superior authority instructs subsidiary authorities to act in an organised way to achieve one or more purposes.

Competition: where many different suppliers provide a particular service or good through a market and the individual consumer can choose which supplier offers the best combination of service or good with price, privatisation being a potential example.

Using these terms, the adoption of any of these technologies will not happen unless:

1. there are organisations which have the powers to either implement themselves, or to influence the adoption of, that technology by others.
2. they have the incentives to promote the adoption of that technology. Where the organisations need to cooperate or collaborate in order to implement the technology, they all have to have some incentive to cooperate or collaborate.

Institutional mapping is the process of identifying which organisations have which of the powers necessary to either implement or promote the adoption of a specific technology, and identifying what the incentives for them to do so.

So, there are five elements:

- What are the relevant organisations which have influence as to whether or not some technology will be widely adopted?
- What the geographical and functional boundaries of those organisations? In particular, are there gaps, overlaps or ambiguities as to the boundaries of the different organisations? Definitions (e.g. what is a 'sewer', what is a 'river') are crucial to establishing boundaries.
- What other organisations have influence, formal or informal, over another organisation? What are the incentives that power creates for the impacted organisation?
- What influence, power, over others does one organisation have? What incentives does it have to use those powers to promote the technology in question?

Thus, institutional mapping involves describing the institutional system: identifying the elements, organisations, and the relationships between them. The problem is that we are mapping something which exists in geographical space but also in institutional space; that is, in more than three dimensions. Hence, the term 'institutional mapping' is a metaphor rather than a conventional map being the output. Instead, the tools for summarising the results which have been found to be useful so far:

- Tables of responsibilities (e.g. **Table 1**)
- Diagrams showing the inter-relationships of responsibilities between individual organisations (e.g. **Figure 1**).
- Figures showing the functional or geographical boundaries of the responsibilities of the different organisations involved (e.g. **Figure 2**).

Table 1 **Summary of principle legislation, guidance and codes of practice relevant to SUDS**

Nature of legislation	Legislation
Supranational Legislation	<ul style="list-style-type: none"> • Water Framework Directive, 2000 • Urban Waste Water Treatment Directive, 1991 • Habitats and Birds Directive, 1992 • Aarhus Directive, 2003 • Integrated Pollution Prevention and Control

	<p>Directive, 1996</p> <ul style="list-style-type: none"> • Dangerous Substances Directive, 1976 • Environmental Impact Assessment Directive, 1985 • Strategic Environmental Assessment Directive, 2001
Primary legislation	<ul style="list-style-type: none"> • Water Industry Act, 1991, 1999 (Section 104) • Town and Country Planning Act, 2005 (Section 106) • The Highways Act, 1990 (Section 38) • Planning and Compulsory Purchase Act, 2004 • Environment Act, 1995 • Public Health Act, 1961 • Land Drainage Act, 1991, 1994 • Water Environment Regulations, 2004 • Sewerage Act, 1989 • Environment Protection Act, 1990 • Water Act, 1989 • Water Resources Act, 1991 • Civil Contingencies Act, 2004
Secondary legislation	<ul style="list-style-type: none"> • Building Regulations (Part H), 2006 • Groundwater Regulations, 1998
Approved Codes of practice	<ul style="list-style-type: none"> • Construction (Design and Management) Regulations, 1994 • Interim code of practice for Sustainable Drainage Systems, 2004
Policy Guidance Notes and Policy Statements	<ul style="list-style-type: none"> • PPS1 Sustainable Development • PPS3 Housing • PPG23 Planning and Pollution Control • PPS25 Development and Flood Risk
Technical guidance	<ul style="list-style-type: none"> • Sewers for Adoption Version 6, 2006 • Sustainable urban drainage systems – design manual for England and Wales, CIRIA (C522), (Martin et al, 2000) • Sustainable urban drainage systems – best practice manual, CIRIA (C523) (Martin et al, 2001) • Source control using constructed pervious surfaces, CIRIA (C582), (Pratt et al, 2002) • Sustainable drainage systems – hydraulic, structural and water quality advice, CIRIA (C609), (Wilson et al, 2004) • Model agreements for sustainable water management systems. Model agreements for SUDS. CIRIA (C625), (Shaffer et al, 2004) • Preliminary rainfall/runoff management for developments (EA/Defra, W5-074/A)

Figure 1 Relations between central government departments and the different levels of local government

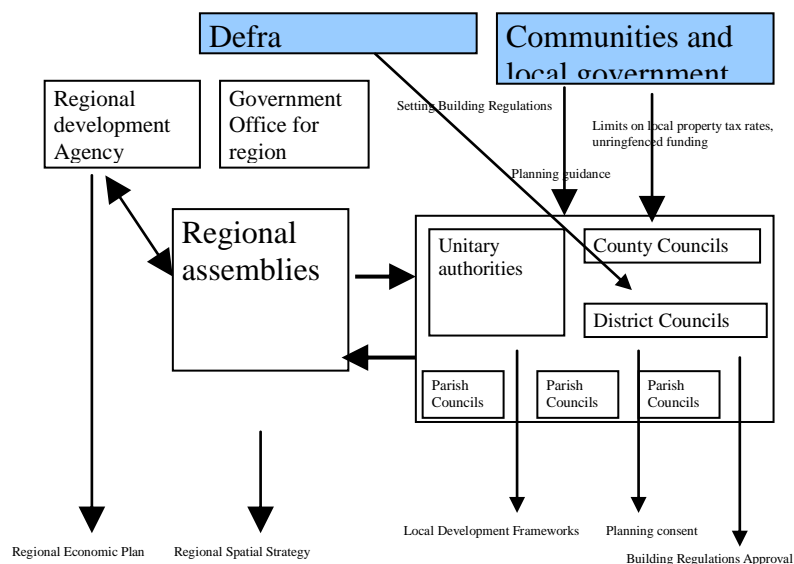
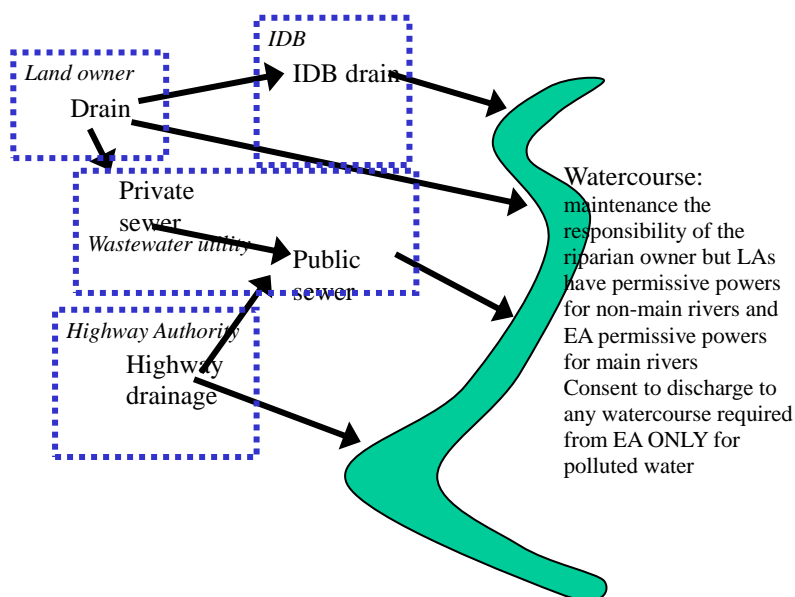


Figure 2 Functional boundaries with respect to surface water drainage



Defining the technology

The technologies which make up sustainable urban water management are relatively mature and most have already been adopted to some extent and in some form somewhere in the present or in the past. So, the question that is being addressed is to some extent:

- Why has it not already happened? Why has this technology not already been widely adopted in this city and elsewhere?

To start to address this question that technology has first to be defined. A lifecycle approach must be taken; too often innovations have failed to be successful because only the construction, in the case of physical systems, has been considered. For example, separate sewers were a very logical idea but given that the rate of misconnections to foul or surface water sewers is variously estimated as 10-30%, much of the advantage has been lost. Is it realistically possible to reduce this rate? Flapper valves on toilet cistern in theory allow a lower flush to be used as compared to a siphonic cistern but in practice, unless well-maintained, the high leakage rate negates the theoretical advantage over the siphonic cistern. How will good maintenance be achieved?

The obvious questions are: how will it be maintained and operated, what are the necessary actions for maintenance and operation, who will maintain and operate it, how will these actions be funded? Who else can act on them? For example, roads may be opened up by the different utilities in order to access pipes, cables, ducts and so forth. Who can open up a road and what are the conditions under which they operate? Unless permeable pavements are restored appropriately after such works have been undertaken, a degradation in performance is likely, particularly if the materials are stored on the pavement whilst such works are undertaken.

The four obvious reasons why a technology has not been widely adopted are:

1. The technology is inappropriate or does not work.
2. An individual organisation lacks the incentive to act and action by that organisation is a necessary precondition for successful adoption.
3. The different organisations either lack the incentives for the necessary cooperation or collaboration, or are unable to do so.
4. The organisations lack the power necessary to influence the actions of those who would adopt the technology. Or, those powers are ineffective in practice.

Institutional mapping is concerned with the last three problems; the simplest outcome is a variation of point 3 where all that has so far inhibited adoption are the practical problems of cooperation or collaboration, an issue which Learning Alliances are intended to contribute towards solving.

The fourth potential reason is a difficult one. That powers appear to exist does not mean that they are effective. So it is not enough to identify the existence of a form of power, the critical question is whether or not it will be or is effective. Two common forms of power that can vary in effectiveness are:

1. regulations
2. prices

For example, it is very easy to introduce a regulation requiring all new development must have the consent of some authority. But over much the world, including southern Europe, the majority of development takes place in violation of such planning rules.

It is difficult to determine what is the effectiveness of different forms of power; there is no statistical analysis of the number of breaches of different forms of planning controls in the UK. For example, there is a prohibition of undertaking works within a distance of flood embankments but **Figure 3** illustrates work which has actually been undertaken on the embankment itself, and others in the area have built flower beds and similar activities on the embankment. However, it is thought that the major conditions for planning consents generally have a high compliance rate in England for two reasons:

- It is seven years after construction until consent is deemed to have been given when it was not originally formally given. It is often neighbours who inform on breaches because that breach damages their interests.

- The majority of housing is owner occupied and owners borrow money to buy property. It is therefore in the interest of the company providing the mortgage to ensure that the property has a value at least equal to the mortgage they are providing. Illegal development could be required to be demolished and so cannot count against the resale value. Therefore, it is expected that the legal searches undertaken at the time of purchase on behalf of the mortgage company will reveal any illegal development.

Figure 3 Construction on the inward bank of a flood defence embankment



What do you do with it?

If the innovation offers advantages over the existing options then the failure to adopt that innovation already suggests some problem within the existing institutional structure. The purpose of institutional mapping is to provide a diagnosis of where that problem arises and to enable one or more remedies to be identified. Those remedies will however be more or less difficult to implement; a remedy requiring a constitutional change is unlikely to be practical.

The sorts of problem therefore that may be identified are:

- Cooperation/collaboration is difficult to establish and maintain so organisations are concentrating on those things which are easier to deliver; either on the actions that they can take on their own, or the big things where the additional costs of cooperation or collaboration are justified. One remedy is to reduce the cost of cooperation and collaboration, or to increase the incentives.
- There are gaps or ambiguities in terms of boundaries which are therefore not being filled. Redefining those boundaries generally requires action at a higher level (e.g. national legislation).
- Increase the incentives on others to act; the scope for doing this depends upon functional boundaries of organisations.
- The available powers are ineffective or are being used ineffectively.

Appendix 2 Institutional Mapping Protocol for Sustainable Urban Water Management: Birmingham Case Study

Author: Colin Green, Middlesex University

May 2007

Summary Overview

This is a comprehensive 138 page document which was written by Colin Green just over a year into the SWITCH project. It is a very useful resource document for any person involved in the water sector in the UK, and also a pioneering piece of work in terms of explaining and demonstrating the concept of “institutional mapping”.

The first 45 pages, sections 2 to 8, provide the overall context and rational and methodology for institutional mapping (IM). Section 2 summarises the lessons learned from undertaking Institutional Mapping in Birmingham and outlines the methodology used for this work. Sections 3, 4 and 5 provide the rational for institutional mapping in the context of the overall aim of more sustainable urban water management, building on the case for institutional mapping set out in established in the review of governance “Mapping the Field: Landscapes of Governance”. Section 6 and 7 define more precisely what institutional mapping is and includes a number of useful operational definitions of key terms and some reflection on the emerging theoretical basis for institutional mapping. Section 8 provides a “protocol” for institutional mapping, which is set of key questions to be answered for an institutional map relating to Urban Water governance in a particular city.

Pages 50 to 116, sections 9-17, contain a detailed case study of water governance in Birmingham. This case study demonstrated how the IM protocol can be implemented to provide an array of complex interconnected information. The format used enables conclusions to be drawn regarding the potential scope for technical intervention in aspects of urban water management in Birmingham city, within the wider legal and policy context for water governance in the UK. Section 9 provides the local historical and geographical context for water governance in Birmingham and Section 10 sets out who the key institutional players or stakeholders are and what respective roles, powers, duties, operational norms and strategic interests are. This includes European policy directives, important national institutions involved with different aspects of water governance which directly affect Birmingham, and the local city stakeholders.

Sections 9 to 17 map in more detail the institutional arrangements relevant to a number of technologies which are potential interventions for improving the sustainability of water management in Birmingham. Birmingham’s main water supply comes in a pipe from Wales, another country in the UK over 100 miles away. Section 9 explores Demand Management as a means of addressing periodic and long-term threats of water shortage. Birmingham has experienced more frequent flooding in recent decades, and Section 10 explores Sustainable Urban Drainage Systems (SUDS) in some detail. Section 11 covers Water Recycling and reuse, and looks at institutional issues relevant to recycling technologies, including the use of green roofs which are a SWITCH demonstration in the city. Section 14 looks very briefly at regulation relating to use of “Ecosanitary devices” such as waterless urinals and composting toilets. Section 15 outlines the limited potential for alternative forms of Waste Water

management in the city. Section 16 documents the history of urban horticulture and the absence of regulation to curb the current trend of converting household garden areas to impermeable surfaces, creating more run-off problems in the city. Section 17 sets out the governance regulations relating to management of solid waste and various barriers to preventing the separation of solid waste from water travelling through the sewers in the city.

Section 18 has a detail list of references and Section 19 a useful glossary of terminology used in the report. Sections 20-24 (Appendix 1-4) contain useful background information relating to water management in Birmingham, including a fact file, an overview of water resources, a summarised institutional history and a list of relevant stakeholders and initiatives in the city.

Full report at <http://www.switch.watsan.net/page/4304>

Appendix 3: Latin America Comparative Analysis

Mapping Governance of Urban Sanitation in Latin America; Case Studies from Belo Horizonte, Cali, Lima and Tegulcigapa.

Smits, S., Galvis, A., Bernal, D.P., Visscher, J.T., Santandreu, A., Nacscimento, N, Sanchez, E., Butterworth, J

February 2009

Executive summary

Cities in Latin America face a double challenge in environmental sanitation, of both providing access to basic water supply and sanitation for those currently lacking that, and improving the collection and treatment of wastewater and solid waste. Governance is a crucial factor affecting the way in which these challenges can be met. The last decades have seen a package of governance reforms, such as decentralisation, the establishment of independent regulators and water resources authorities, and democratization of decision making procedures. However, the degree to which these reforms have actually been implemented and worked out is different in the countries and cities of the region.

This report looks into governance arrangements in four Latin American cities: Belo Horizonte (Brazil), Cali (Colombia), Lima (Peru) and Tegucigalpa (Honduras). These cities are all seeing efforts to address environmental sanitation in a more integrated manner; addressing governance aspects is integral to these efforts. Understanding current governance arrangements provides the basis for these. This report provides an analysis of the actual governance arrangements in these cities, and looks into similarities and differences between them. It also provides conclusions and recommendations for addressing governance in efforts to develop integrated approaches to urban environmental sanitation.

The types of governance reforms mentioned above have also been implemented in the four case cities, albeit in different ways. The institutional frameworks are therefore all different. Yet, some trends are observed. First of all, all frameworks are characterised by a high degree of specialization in the roles fulfilled by the different organisations. Water supply and sanitation service provider roles are separated; water resources authorities and independent regulators are established, and specific roles assigned to civil society groups. This specialisation necessarily means a corresponding level of fragmentation of roles and functions over different organisations. In itself, this is not a problem, as long as there is coordination and integration between these actors in planning processes. Specific mechanisms for integrated planning are needed and were seen, including the municipal sanitation council in Belo Horizonte, or participatory budgeting processes in Lima and Belo Horizonte. Water resources institutions, such as catchment authorities or stakeholder platforms potentially have an integrating role as well, but they require instruments to carry out their role. Where these mechanisms are lacking, stakeholders were found to be developing and implementing their own organisational plans, rather than sectoral plans. Besides, civil society is then often excluded from decision-making processes. Leadership by local government was found to be crucial to achieve coordination and integration between these organisations.

Important progress has been made in establishing control and accountability mechanisms at different levels: between water and sanitation service providers and local authorities, between service providers and independent regulators, and between community groups and authorities. Although these can all be strengthened, these were considered having a positive effect on more transparent and accountable decision-making.

Finally, the report looks into the capacity of stakeholders to carry out their functions. It was found that financial capacity is mostly not considered a main limiting factor in governance. But, there are some gaps in terms of human resources, such as the capacity to follow more participatory approaches, and the capacity of community groups and civil society organisations to engage meaningfully in decision-making processes on sanitation improvements. This is related to their limited access to and use of information on innovative and more integrated approaches to urban environmental sanitation.

The study concludes that standard elements of sector reforms, such as decentralisation, the establishment of regulating entities and setting-up water resources authorities are important components in the strengthening of governance over sanitation. But, the study also shows it shouldn't stop there. Strengthening capacity at different levels and developing mechanisms for inclusive and integrated planning, with its accountability mechanisms, are equally important. It is therefore recommended that the initiatives towards more integrated urban environmental sanitation, such as the ones described in this report, focus on pragmatically working with city stakeholders in activities such as joint planning and facilitating access to and use of information.

Full report available at <http://www.switch.watsan.net/page/4304>

Appendix 4: Institutional Mapping Reports from SWITCH Cities

Introduction

This appendix includes examples of IM reports from two SWITCH demonstration cities (Alexandria and Beijing) and summaries of the IM reports from other demonstration cities which undertook these studies (Accra, Belo Horizonte, Cali, Hamburg, Lima and Zaragossa). The full version of the other IM reports are published as stand alone documents. The reports from Alexandria and Beijing were included in full because they are relatively short, and including other IM reports would have made this document very long. In both cities the researchers found it difficult to gather the relevant documents and information, and make sense of a very complex set of institutional arrangements. Both reports provide an overview of relevant national institutions and regulations which impinge water governance in the two cities. The IM reports for Alexandria and Beijing illustrate how the institutional mapping in each city relates to different focal areas of SWITCH project activity; Alexandrian being steered mainly by the city learning alliance priorities, and Beijing by the technical focus of the demonstrations in a city without a learning alliance.

Alexandria, with a population of over 4 million, is the second largest city in Egypt. Compared to most of the other SWITCH cities, Alexandria has a very long history of developing a wide range of institutions for water governance to address the challenge of many competing demands for its main water supply. The institutional mapping report gives an overview of the more important institutions involved in water management. It sets the SWITCH city learning alliance within the current water governance context and outlines the potential governance role and effect that the learning alliance and social inclusion demonstration site can have on the overall direction of water governance and strategic planning for water management in the city.

Beijing, with a population of over 22 million, is the largest and most dynamic of the SWITCH cities. Like Alexandria it has a long history of institutional development and a hierarchical set of formal institutional arrangements and formal and informal power relations around water governance. The institutional mapping report gives an overview of the many institutions involved in water management at various levels. In contrast with Alexandria Beijing did not establish a city learning alliance. The governance report includes the analysis of institutional issues relating to the SWITCH demonstrations in the city; waste-water recycling and rainwater harvesting for urban agriculture.

Most of the IM reports from the other cities similarly illustrate the link between the institutional mapping process and the technical focus in the city discussed in each city's learning alliance. The exceptions are the Birmingham and Zaragosa IM reports. In the case of Birmingham, it had a city learning alliance, but the researchers doing the IM were not closely involved with it. In the case of Zaragossa, there was no learning alliance and the IM was undertaken by a researcher not closely linked with the other project researchers looking at demand management and leakage control as interventions.

Appendix 4.1 Alexandria

Institutional Mapping and Water Governance Analysis in the City of Alexandria

Khaled M. AbuZeid¹ and Mohamed H.Elrawady²

March 2010

Introduction

Despite its importance and its widespread employment in policymaking practice, the theoretical and epistemic foundations of institutional mapping have not been elaborated and its legitimacy is yet to be fully granted by the academic community.

This report consists of an institutional map and analysis defining the governance structures and politics of urban water management in Alexandria. The report will identify where powers and funding reside for each possible intervention strategy, with particular reference to the elaboration of the proposed Integrated Urban Water Management (IUWM) plan. It will also present a number of recommendations for action with regard to institutional arrangements in Alexandria. The report will build on relevant work carried out or being developed under the SWITCH project (e.g. scoping visit, stakeholder analysis, Alexandria Learning Alliance (LA) progress report, Alexandria Demonstration social inclusion baseline study). More precisely, it will expand the available knowledge basis by referring to the existing official documentation (e.g. National Water Resources Plan 2005-2017), as well as a range of primary and secondary sources of empirical evidence. Primary sources might for example include interviews of relevant stakeholders including members of the Learning Alliance. Secondary sources refer to published articles and reports and other external documents containing factual information.

The term "Governance" relates to decisions that define expectations, grant power, or verify performance. It consists either of a separate process or of a specific part of management or leadership processes. SWITCH has a big role in assuring the application of fair governance in the Alexandria water sector. Fair governance implies that mechanisms function in a way that allows the executives to respect the rights and interests of the stakeholders, in a spirit of democracy. Therefore, the relevance of the LA that was assembled by SWITCH is particularly obvious.

Over the last decade, several efforts have been conducted in the research and international development community in order to assess and measure the quality of governance in different sectors in many countries around the world. One of these efforts to create an internationally comparable measure of governance is the Worldwide Governance Indicators project, developed by members of the World Bank and the World Bank Institute.

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There is no evidence of any sources of information on governance in the Alexandria water sector other than the SWITCH project. However, no measures for Governance are currently applied.

IUWM and Egyptian NWRP

The main expected output at the end of the SWITCH project is an Integrated Urban Water Management plan. Such plan will be highly influenced by the institutional mapping of the water sector and its success will depend largely on how the main key players in the sector believe in it. It is extremely important that any progressing plan considers previously developed plans. An IUWM plan is in fact an Integrated Water Resources Management (IWRM) on the city level.

Egypt met the 2005 Integrated Water Resources Management (IWRM) specified target by preparing a very comprehensive National Water Resources Plan (NWRP) through a multi-stakeholder and participatory approach under the lead of the Ministry of Water Resources & Irrigation.

Formerly called the Ministry of Irrigation and the Ministry of Public Works and Water Resources, MWRI is responsible for national water resources and is the only body to authorize use of water from the Nile, canals, drains, and groundwater sources. The ministry also has control over works built to discharge water into canals, drains, and the Nile. MPWWR is authorized to assess penalties if its orders are not obeyed.

NWRP was carried out by the Ministry of Water Resources and Irrigation (MWRI) with the support of the Government of the Netherlands. The main objective of the plan is safeguarding Egypt's future water needs. The other objectives are as follows:

- To increase economic growth to 7.6% for the period 2003-2017
- To increase per-capita GDP to \$4,100 in 2017
- To increase inhabited area from 5.5% to 25% by 2017
- To expand agriculture development by 3.4 million feddans by 2017 including:
 - 220,000 fed in the East Delta
 - 400,000 fed. North Sinai
 - 500,000 fed South Egypt
 - 447,000 fed Oases on groundwater
- Protecting the Nile & water resources from pollution
- Promotion of integrated pest control and limitation on the use of agro-chemicals
- Extension of sewage networks and wastewater treatment plants
- Promotion of water conservation in domestic, agriculture and industry uses

The previous objectives are all somehow water related, there are also some policy objectives that revolve around supporting the socio-economic development of Egypt on the basis of sustainable management of water resources while protecting the natural environment as follows:

- Supply drinking water and provision of sanitation services according to standards and targets on a cost recovery basis while ensuring the right to basic requirements to all people

- Supply of water for industrial purposes and provision of sewage treatment facilities on a cost recovery basis
- Supply of water for irrigation based on a participatory approach and cost recovery of O & M
- Protection of the water system from pollution, based on a polluter-pays principle and the restoration of water systems, particularly in the ecologically important areas

Moreover, there are some strategic measures involved in NWRP such as:

- Development of new water resources and cooperation with the Nile Basin riparian countries
- Making better use of the available water resources
- Protection of public health and environment
- General Institution, Legal, & Financial Measures

The plan is actually implemented by a national executive committee that comprises five other ministries beside MWRI. The names of these ministries and a brief description of their roles are presented hereby:

1) The Ministry of Housing:

- Increasing the amount of treated wastewater.
- Decreasing losses in water supply networks.
- Cost recovery of water supply services.
- Spreading public awareness about water preservation.

2) The Ministry of Agriculture:

- Promoting Environment-friendly agricultural techniques.
- Regulating the use of organic fertilizers.
- Increasing rainfall harvesting along the northern coast.
- Studying the possibility of cultivating high salinity enduring crops.

3) The Ministry of environmental affairs:

- Spreading public awareness about water preservation. .
- Spreading public awareness about water quality preservation.
- Observing and reporting industrial pollution.

4) The Ministry of Health:

- Protecting groundwater from pollution.
- Allowing a higher degree of salinity in irrigation water.
- Setting water quality criteria.
- Continuing family planning campaigns.

5) The Ministry of Industry:

- Rewarding industries that treat their wastes.
- Promoting water saving technologies.
- Primary treatment of industrial wastes.
- Moving factories overlaying vital water ways.

NWRP also recognizes the roles of other entities including non governmental organizations, local and regional water councils, civil society and the private sector.

Expected Results of the NWRP:

By 2017, the following achievements are expected:

- Agriculture Area will increase by 35%
- Increasing inhabited Area for more than 20% of Population
- Provide Safe Drinking water to 100% of the population
- Double access to Safe Sanitation from 30% to 60% of population
- A National Water Council will be established
- GDP will increase from 246 Billion LE in 1997 to 789 Billion LE
- Employment in Agriculture will increase from 5.01 to 7.30 m. person/year and in industry from 2.18 to 4.99 m. person/year
- Overall Water Use efficiency will increase from 70% to 77%
- Outflow to sinks will decrease from 16.3 to 12.5 BCM/year
- Unaccounted for losses in the Potable Water Supply will decrease from 34% to 25%

Table. 1 shows a comparison between the expected results with and without implementing NWRP with respect to many aspects.

Business as Usual	NWRP
<ul style="list-style-type: none"> ➤ Gross Ag Production Value: 35.76 BLE ➤ Crop Intensity: 1.5 ➤ Net Value Production per feddan: 2,075 LE/fed ➤ Export / Import Value: 0.12 ➤ Navigation Bottlenecks: 144 ➤ Employment in Agriculture: 6.24 m. persons/year ➤ Outflow to sinks: 17.6 BCM ➤ Overall Nile Water Use Efficiency: 67% ➤ Agriculture supply/demand ratio: 0.8 ➤ Ag. Water availability: 3,285 m³/fed/year ➤ UFW Losses: 34% ➤ Potable supply/demand ratio: 0.76 ➤ E-coli Standard violation: 121 ➤ Condition in Bardawil: (-) ➤ Condition in Coastal lakes: (-) 	<ul style="list-style-type: none"> ➤ Gross Ag Production Value: 38.50 BLE ➤ Crop Intensity: 1.7 ➤ Net Value Production per feddan: 2,153 LE/fed ➤ Export / Import Value: 0.20 ➤ Navigation Bottlenecks: 0 ➤ Employment in Agriculture: 7.3 m. persons/year ➤ Outflow to sinks: 12.5 BCM ➤ Overall Nile Water Use Efficiency: 77% ➤ Agriculture supply/demand ratio: 0.92 ➤ Ag. Water availability: 3,866 m³/fed/year ➤ UFW Losses: 25% ➤ Potable supply/demand ratio: 1.0 ➤ E-coli Standard violation: 110 ➤ Condition in Bardawil: (+) ➤ Condition in Coastal lakes: (0)

Table. 1 Expected results comparison.

Official Laws/ Decrees

In November 2005, an official presidential decree was declared. The decree stated that all informal settlements must be provided with water supply.

The previous decree is of particular relevance to the SWITCH project, as an informal settlement was the scope of the SWITCH demonstration project.

One fifth of Alexandria's population live in rural areas. These areas have a rural and Bedouin societal structure which contributes to the large rural life style in El Ameriyah, Sharrk, Wassat, El Montazah and Borg El Arab districts.

By 1996, there were about 36 informal areas, covering a total area of about 34.11 km². Such areas were occupied by about 848062 persons, representing about one-quarter of the total population of Alexandria governorate. This high concentration of population has led to an overall population density of about 24864 person/ km².

By 2005 there have been about 50 informal areas in Alexandria covering an area of 7830.3 acres, accounting for about 9.7% of the total area of Alexandria governorate. These areas accommodate as much as 1.4 million inhabitants, representing 41.8% of the governorate total population. Such informality could limit the chances of residents in obtaining basic infrastructure and services. It was suggested accordingly that prohibitions of informal areas development on agricultural land did not work, which meant that current trends would continue as long as alternatives are not offered to informal land and housing markets.

Maawa Alsayadeen (Fishermen's Village) has been selected as the demonstration site by both the governorate of Alexandria and SWITCH experts. It is an unplanned area, with narrow streets. Tenure arrangements for households in these subdivisions are unclear and there is also a small area of illegal housing. SWITCH will focus on facilitating planning of upgraded basic infrastructure (water, sewerage and drainage); test some of the IUWM interventions, and present a model of how to implement IUWM in informal settlements for what may be considered the village/ city of the future.

From focus group discussions that were organized through the SWITCH Learning Alliance (LA), the main problem with the water supply is the fact that many households remain without connections, due to the governor's decree preventing further connections. The governor's decree has aroused some controversy as it seems to be contradicting to the presidential decree. An explanation that was given by an Alexandria governorate official helped in decreasing the confusion. He claims that the governor's decree is applicable on household that were established after the presidential decree in November 2005. According to that explanation, it could be assumed that all households in Maawa alsayadeen that existed prior to November 2005 are currently covered with water supply and the governor's decree aimed to prevent further informal settlements.

The governor's decree may be of great significance to the SWITCH project that targets Maawa Alsayadeen as a demo site and plans to increase the metered connections in it, it is important to assure that future interventions go in line with the overall policy of the governorate.

The integration between different ministries has been well assured and reflected in various national decrees and laws. It dates back to 1966 when a presidential decree (2703, 1966) stating that the Ministry of Health must form a high water committee was issued. It aimed at enhancing the role of the Ministry of Health in checking all health issues related to water. The committee included members from the Ministry of Agriculture, the Ministry of Irrigation, and the Armed forces. The decree has assigned many tasks to the new committee, including setting standards for raw water treatment and delivery.

Law 48 for the year 1982 has defined all water resources that can be utilized for drinking purposes. It was preceded by Law 27 for the year 1978. Article 2 of that law has granted sole authority to the Ministry of Housing for granting permits to individuals/ entities wishing to use a particular water source for the purpose of delivering drinking water for human use. Article 6 of the same law has incorporated the role of the Ministry of health in deciding whether particular canal intakes are appropriate for the purpose of delivering drinking water.

In 1980, the Minister of Housing issued an important decree concerning ground and elevated water reservoirs. Decree 111 has specified certain requirements in such reservoirs including being covered so as to prevent the entrance of insects and having openings for cleaning and excess release. The decree also stated that considerations must be made to avoid the seepage of groundwater and drainage water to ground reservoirs. The decree also included a more specific description of “public water resources” which is totally isolated from sources of pollution.

On the governorate scale, governors have always contributed positively to the water sector by issuing relevant decrees. Egypt has seen a significant increase in urbanization in the seventies that was accompanied with a huge preference towards vertical expansion, which introduced a new problem; in many buildings water did not reach higher levels of buildings. The governor of Cairo issued decree 897 for the year 1972 that stated that all individuals or entities seeking building permits for buildings 14 meters or higher than the street level must install water pumps and elevated reservoirs to assure the delivery of water to the higher building level. The Governor of Alexandria issued a similar decree in 1979.

The Governor of Cairo issued decree 26 for the year 1978; the decree included a comprehensive list of water users categories with an appropriate tariff system for each category. That decree was in line with the decree issued by the Minister of rural affairs in 1961 with many additions. It is worth mentioning that the 1961 decree has put a huge responsibility on property owners to install appropriate water connections.

A new law for water supply and wastewater has been drafted in September 2009, it also incorporate the roles of all previously listed ministries and entities, in addition to the Ministry of Economic Development, the Ministry of International Cooperation, and the Ministry of local Development.

Wastewater policies and Decrees:

The following is a brief overview of all laws/ decrees codes related to Wastewater:

- Law 93/1962 establishes Standards for wastewater discharge into the sewer system.

- Law 27/1978 regulates public sources of drinking water. It instructs and empowers the MHP to set standards for potable water.
- Law 48/1982 regulates the discharge of waste and wastewater into the Nile and its waterways and sets standards for the quality of effluents. The law establishes the responsibilities of the MWRI and the Ministry of Health in monitoring the quality of effluents discharged into the Nile River (and its associated drainage system, lakes and groundwater) to ensure that water quality standards are met. Industrial establishments are required to obtain pollution discharge licenses. A bond is required with the license application and a fee of L.E. 0.1 (one piastre) per cubic meter of effluent is levied according to Article 82 of the implementing regulations. Under this Law, the Ministry of Health has the obligation to carry out periodic sampling and analysis of wastewater and waste discharge from establishments that are licensed to discharge to waterways. (Dr Hellaly, personal communication, 2009)
- Decree No. 649/1962 of the Minister of Housing issues the executive regulations of Law 93/1962. It specifies regulatory standards for wastewater disposal. It was updated in 1989 by Decree No. 9/1989 in which a distinction was made between wastewater disposal on sandy soils and clay silt soils. Most prominent conditions included that wastewater treatment plants should be located more than three kilometres from the nearest residential area. Primary treatment was set as a minimum treatment level required before final discharge (Hellaly, 2009).
- Reuse of effluent in the irrigation of vegetables, fruits or any other crops eaten uncooked is strictly prohibited. The same restriction is imposed on grazing of animals or milking cattle on the fields irrigated with wastewater. In 1995 an amendment was made by both the Ministry of Irrigation and the Ministry of Agriculture and approved by the Ministry of Health. It has been issued by the Minister of Housing decree No 44/2000. This amendment determined the minimum degree required for wastewater treatment for the various reuse aspects (Hellaly, 2009).
- A code of practice for reuse is now prepared and it is about to be published

Water Resources Management in Alexandria:

History

Water resources in Egypt are becoming scarce. Surface-water resources originating from the Nile are now fully exploited, while groundwater sources are being brought into full production. Egypt is facing increasing water needs, demanded by a rapidly growing population, by increased urbanization, by higher standards of living and by an agricultural policy which emphasizes expanded production in order to feed the growing population. Alexandria is no exception. The Nile River is currently the sole source for urban water.

Improved planning and management procedures to allocate and use water are key measures generally prescribed to make the optimum use of available water.

Satisfying future demands in Egypt depends on better utilization and efficient use of present water resources. Optimal water management is an essential prerequisite for sustainable development of Egypt. The future may carry lots of risks if Egypt does not succeed in formulating and implementing a water policy which can match the limited freshwater supply with the increasing demand.

The main objective of water planning in Egypt has been to harness the highly fluctuating Nile flows, making them available for domestic and productive purposes. The means of fulfilling this objective have been to establish over-season storage, over-year storage, and flood control. These goals were basically achieved in 1971 following the inauguration of the Aswan High Dam (AHD).

Even though irrigation has taken place in the Nile Valley for nearly 5000 years, it is only in modern times - starting around 1850 - that the erection of water control structures such as barrages, canals, weirs was begun. Except for the Nile itself, every bit of the Egyptian water conveyance system is man-made and thus an expression of planned effort. The Egyptian irrigation system is tremendous in size and complexity. It consists of the Aswan High Dam, eight main barrages, approximately 30,000 km of public canals, 17,000 km. of public drains, 80,000 km. of private canals (mesqas) and farm drains, 450,000 private water-lifting devices (sakias or pumps), 22,000 public water-control structures, and 670 large public pumping stations for irrigation. Throughout this system, approximately 59 billion m³ of water are distributed annually, not only for cultivated land, but also for municipal and industrial use, for generation of hydro-electricity and for the navigation of freighters and tourist boats on the Nile.

In Egypt, water planning is said to have started in 1933 when a policy was formulated to use the additional storage capacity made available by the second heightening of the old Aswan Dam and the Gabal El-Awlia Dam in Sudan. This plan introduced programmes for land-reclamation, conversion of some basin irrigation to perennial irrigation, and increases in the areas under rice cultivation. This policy was first revised in 1974 and again in 1975 when a new plan was drafted to accommodate the extra volumes of water resulting from the erection of the AHD.

In 1981, the first attempt was made to create a master plan for all water use in Egypt. It was carried out in the early 1980s under the auspices of UNDP and the International Bank for Reconstruction and Development (IBRD). The minister of irrigation at the time pointed out the objective to be achieved by this effort: "Because of this increasing competition for water and its limited availability, it was imperative to introduce new scientific techniques, and to use mathematical models to design future plans for water development, and to ensure efficient use of this resource." The resulting plan, the "Arab Republic of Egypt Master Plan for Water Resources Development and Use" is, however, not a plan as such, but a first step in an process which is intended to lead to improved planning capabilities within the sector. The main objective of the plan is to implement planning tools (i.e., to establish data bases and build flow models) which will make it possible to plan the development and use of water resources with greater precision in the future and, thus, to guide investment decisions.

A prerequisite for good water planning is an administrative framework, which through management and monitoring, can provide information upwards through the system to feed

into the planning exercise. A real planning capability, thus, entails a broad-based knowledge and a set of procedures and standards in the administration which are present at different hierarchical levels. The administrative framework established for water planning and management currently in use was outlined in NWRP 2017.

Institutional Framework and Actors Mapping:

In addition to MWRI, a number of other ministries are also involved in water management and use, including agriculture and land reclamation, health, tourism, power, transportation, industry, and housing and reconstruction.

Two ministries, agriculture and land reclamation, and health, hold special responsibilities in their management role of water. The ministry of agriculture and land reclamation has special responsibilities because agriculture consumes around 85 per cent of the water. Prior to 1992, when cropping patterns were liberalized, the ministry of agriculture and land reclamation decided, in consultation with the ministry of industry, which crops were to be grown in which localities. Such planning was undertaken a year in advance. From this exercise, the ministry requested specific volumes of water to be delivered to each canal and each branch canal. Following the liberalization of the cropping pattern, however, it is not known precisely how the water allocation takes place. The ministry of health, which also holds special responsibilities, is authorized to close potable water supply works if the water produced does not meet standards. The ministry of health is further responsible for drafting quality standards for various water uses and for discharges of waste water.

To ensure co-ordination among agencies involved in water resources, three committees have been formed under the umbrella of MWRI. Two of them, the Supreme Committee of the Nile, headed by the minister of the MWRI, and the Co-coordinating Committee for Land Reclamation meet monthly to direct and review different developments plans, as well as to resolve conflicts between ministries. The third committee is called the Inter-Ministerial Committee on Water Planning (ICWP) and was established in 1977 as a part of the Master Water Plan project. ICWP is, as the name indicates a cross-ministerial committee with a strict focus on planning. It has been given the responsibility to set planning assumptions and review development plans.

Outside observers do not know much about how this administrative set-up actually functions. This, too, is a largely undocumented area. But a review of the literature on the general state of Egyptian bureaucracy documents an organization legendary for its high degree of centralization and inefficiency, resulting from such problems as over-staffing, low salaries, and lack of incentives. In those respects, there are certainly differences among Egyptian ministries and the MWRI is generally known to be among the best functioning in Egypt. The literature suggests, however, that even the administrative set-up for water planning might be haunted by some of the problems mentioned above.

Water Services in Alexandria:

The governorate of Alexandria is the leading executive and administrative body of Alexandria. It regulates the 2679 km² land of Alexandria and its 4 million people. The Ministry of Housing is responsible for all water supply and sanitation services in Alexandria. The Holding Company for waste water, which is under the Ministry of Housing, is the National Organization for Potable Water & Sanitary Drainage which covers water

supply and sanitation to all the governorates in Egypt. It is the umbrella under which all local governorate drinking water and sanitation companies respond to. The Drinking Water and Sanitation sector is structured as follows:

Drinking Water and Sanitation Sector:

After its reform in 2004, the sector comprised the following four main entities:

- Holding company for waste water (HCWW): Responsible for purification, transport and distribution of drinking water along with the safe disposal of wastes.
- The National committee for Drinking Water and Sanitation: Responsible for all the sector's investments outside the governorates of greater Cairo and Alexandria.
- The executive organization for drinking water and sanitation: Responsible for the sector's investments in the governorates of greater Cairo and Alexandria.
- The organizational committee for drinking water, sanitation and customer protection: Responsible for monitoring and supervision of all works related to the sector.

More focus will hereby be devoted to The Holding Company for Waste Water and the companies operating under its umbrella.

Holding Company for Waste Water (HCWW)

The company was established under a presidential decree in 2004 within an initiative to reform the structure of the water supply and sanitation sector. It has a clear message which is providing an excellent water supply and sanitation service accompanied by the environmentally safe disposal of sanitation wastes.

The drinking water and sanitation sector reform included the involvement of the executive organization for drinking water and sanitation. Its role is to allocate, control and monitor funds and investments for all drinking water and sanitation activities in the governorates of Greater Cairo(Cairo, Giza, and Qalyoubiya) and Alexandria.

There are a total of 21 companies under HCWW; most of these companies are in charge of both drinking water and sanitation in their own governorates, as well as new communities. The work force in all these companies is estimated to be 85,882.

Alexandria Governorate is one of two exceptions in Egypt where the drinking water company is separated from the sanitation company. The Alexandria Holding Company for Drinking Water is a sub-branch of the mother company, the Holding Company for Waste Water. It is responsible for water supply coverage within the Alexandria area, while, The Alexandria Holding Company for Sanitary Drainage is another sub-branch of the mother company, the Holding Company for Waste Water. It is responsible for sanitation services within the Alexandria area.

HCWW operates under a set of rules and approaches. The most important of them is the transparency approach followed in policies, revision and financial clearance. These approaches were also designed to be inclusive and communicative, which is implemented in the form of a customer service hotline and a public awareness campaign.

The company's policies are also coherent, integrative and considerate to all potential users. Specialized consultants have been appointed to design a strategic water sector plan for all governorates until the year 2037.

Finally, the policies are designed to be ethical and equitable. There is an ongoing research to decide the most appropriate water service tariff that satisfies the dual goal of making the service accessible for individuals with low incomes while preventing water losses resulting from individual irresponsible behavior. An ideal water tariff should not exceed 4% of any given household income.

The urgent drinking water plan was declared before the summer of 2008 according to a presidential decree. The plan aimed at providing all uncovered area with 24 hours a day access to drinking water. The expenses reached 3 billion LE.

Alexandria 2037 Water Master plan:

The 2037 Water Master plan was developed by Sabbour Consulting; it assumed that the current service area which extends from Abuqir east to Marsa Matrouh west and reaches to Noubaria in the south will remain the same by 2037. The master plan has significantly considered the expected urban expansion at Burg El-Arab in the west and the anticipated industrial expansion in various locations in the governorate.

The master plan revolved around the following four focal points:

- Securing raw water sources.
- Securing service to informal settlements
- Securing service to areas that belong to Beihera Governorate.
- Securing service to areas that belong to Marsa Matrouh Governorate.

It also gives special attention to the following issues:

- Continuous evaluation of existing water supply plants.
- Studying alternatives for improving plants efficiency.
- Studying alternatives for improving networks.
- Setting priorities for future projects.

Alexandria 2037 Sanitation Master plan:

The 2037 Sanitation Master plan was developed by MISR Consulting, it revolved around the following:

- Exploring areas for future expansion.
- Projects to be implemented by the year 2037.
- The budget needed for future projects.

Current Stakeholder Map and Relevance to SWITCH Alexandria IUWM:

The main expected output from SWITCH project in Alexandria is an IUWM plan, therefore an important question is raised, should the institutional setup be modified to cope with the

IUWM plan or should it be the other way round. The answer to that question varies with different cultural backgrounds. A person with a bureaucratic mind setup will tend to have a great respect to an existing institutional setup, while free minded spirits will regard future water needs as a priority that anything else has to adapt to. This study definitely supports the liberal opinion of modifying the current institutional setup to be more decentralized. In the following lines, the main elements of the Alexandria IUWM will be quickly reviewed and the corresponding decision making entity for each particular element will be identified. In many cases there will be more than one authority responsible for a particular water source, only the most influential one will be mentioned.

- Ground Water Management: MWRI is the sole authority responsible for groundwater.
- Storm Water Management: due to the relative insignificance of this resource, it is not clear whether there is a role for MWRI in applying storm water management measures on the urban/ city level. Therefore the Alexandria Waste Water company could be regarded as the main key player in this area.
- Water Demand Management: lies within the responsibilities of Alexandria Water Company.
- Waste Water reuse: Obviously related to the Alexandria Waste Water Company.
- Financial sustainability: is currently an individual responsibility for every key player in the Alexandria Water Sector.
- Desalination: It is not clear who makes decisions regarding that rarely used source.
- Urban Modeling: Capacities are currently being built in the Alexandria Water Company and will be expanded to the whole Alexandria Water sector by the end of the SWITCH project.

The collaboration between all the entities mentioned above has been well strengthened by the SWITCH Learning Alliance (LA). The IUWM plan will be set up and written by actual LA members. This will provide a midpoint between bureaucrats and liberals in the sense that innovations will be made in accordance with current institutional setup except in cases where modifications are necessary.

Challenges and Opportunities:

One of the most important objectives of the SWITCH LA was the involvement of all stakeholders. When examining that in Alexandria, we could easily see that water users are somehow misrepresented in the LA. However, one of the great successes of the LA was its direct involvement in the strategic planning. Involvement of poor and marginalized people in decision making needs a drastic cultural change, not only in Alexandria, but all over the globe. In many places in the world, the poor are a winning card for many politicians to reach their goals and get re-elected. This approach, although not purely orthodox, could be a starting point for social inclusion in Alexandria. This study approves the current institutional setup with one reservation concerning the misrepresentation of average water users. “Water Boards” can be the magical term to better the current institutional setup. In this case, we can introduce an important governmental key player which is “Syndicate of the people” or simply the “Parliament”. Water boards can be directly linked to every syndicate member. That member is responsible for conveying messages from his/her corresponding board to the syndicate which is the highest driving force institutional reform in the country.

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Appendix 4.2 Beijing

Water governance in the water and sanitation sector in Beijing, the capital of China

Meine Pieter van Dijk and Xiao Liang, UNESCO-IHE Delft, Report for Meeting on Water Governance in Switch cities,

February 2009

1. Introduction

For integrated urban water cycle management the water resources, drinking water supply and waste water treatment are three important moments, with each specific problems in China. The water situation in northern China can be described by the word water scarcity. There is not enough water for the different types of use and for the big cities, which have high per capita consumption figures, also because of substantial losses. We will first give some examples of problems in the water and sanitation sector in China. Subsequently the hierarchy of Chinese government will be explained, before describing the stakeholders at the national and municipal level. A separate section is devoted to changes in the water governance structure that have been implemented already in Beijing. At the end the Switch approach to water management is briefly explained and the problems of setting up a learning alliance in a big city like Beijing are briefly mentioned before presenting the governance structure of three demonstration projects, of which one has been supported by Switch. What has been done so far and to what extent the risk of pollution of the water resources have been limited by properly treating used water? At the end we draw some conclusions.

2. Problems in the water and sanitation sector in China

Government water managers in China focus on obtaining the most advanced technology. Not enough attention is paid to managing existing systems properly. Hence the resources are polluted, drinking water is scarce and the quality of the water produced by water treatment plants is not always appropriate, while the consumer price is too low and is also including a small amount for water treatment.

The goals of the Chinese 11th Five Year Plan for the water sector are ambitious. The planners want to reduce for example water consumption per industrial unit by 30 percent and to increase the coverage for water and sanitation facilities in line with the Millennium Development Goals (MDGs). The governance structure to achieve this is relatively simple. It is hierarchical and centralized through the role of the Ministry of Construction and the corresponding line offices at the city and district level. However, it also excludes participation of the users. There are numerous examples of problems with the water cycle in China, which can be partially blamed to this governance model. Just to mention some examples: what is the impact of climate change on water resources and development in China (China Daily, 2-7-2004). What are the risks linked to the current practice of water management for Chinese rivers? Besides drinking water problems in the north, flooding is common in the south, just like polluting the rivers everywhere in China, while rivers are also important for irrigation, drinking water, transport and fishing activities.

An environmental study of the Tai lake near Shanghai carried out by a Dutch consulting firm together with UNESCO-IHE in 2003 showed the seriousness of the pollution for the water resources and the need to introduce waste water treatment plants. It is our experience that the Chinese started building the water treatment plants before the feasibility study was finished. Now they are not always working at full capacity nor turning out the expected quality of water and the lake is still dying rapidly. For an overview of the problems see box 1..

Even the Three Gorges dam may cause serious ecological risks. According to the Financial Times (October 2007) the dam cause more sedimentation, more pollution and more land slides. Four million people may have to move. However, the China Daily reacted a week later that there were no environmental problems in Three Gorges dam!

In Harbin, a big city in the north, the river got very much polluted because of an upstream industrial accident and the population could not drink the water for weeks. This is a big city and the impact of upstream pollution was enormous. The risks in this case were not so much the risks of flooding, but of not supplying clean drinking water to the big cities on the coast. There was no river bank infiltration system which could have mitigated the negative effects of the pollution.

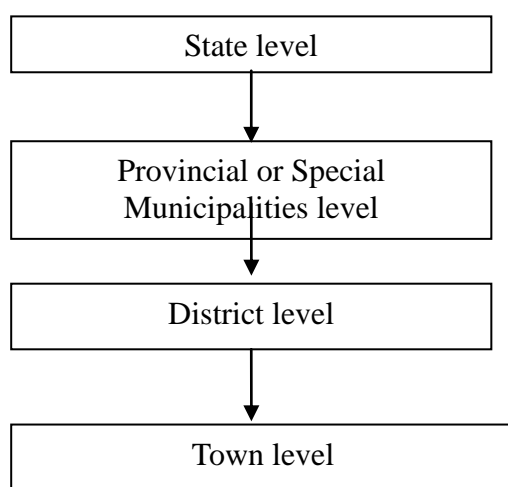
Box 1 The main problems of the water sector in China mentioned in the press

- 1. Prices of water are not realistic (Financial Times, 20-3-2003), but efforts to increase the water prices by 30% have not been approved by the Municipal Commission of Development and Reform (China Daily, 2-7-2004).
- 2. The river transfer project is extremely costly (Financial Times, 20-3-2003)
- 3. Pollution has led to algae in the Yellow sea (NRC, 17-6-2004)
- 4. The risks in the water cycle are substantial
- 5. The emphasis is on the hardware and not enough attention is paid to managing the systems in a more optimal way.

3. The hierarchy of Chinese governance

Beijing is the capital of China with an estimated 15 million inhabitants. It is located in the north of China and is facing severe water scarcity problems. Given the negative effects on the environment, Beijing has decided to direct businesses which utilize large amounts of water out of the city (China Daily, 10-4-2004). Several projects to link the southern rivers (in particular the Jiangtze river) with northern rivers (in particular the Yellow river) are undertaken to guarantee that enough water will be available. This is important in particular for the Olympic games which will start 8-8-8, three times the lucky number in China.

The Chinese governance structure is a multi-layered hierarchy. The various agencies within the structure are divided by territory, function and rank. Figure 1 shows the hierarchy in terms of the territory. The arrows lead from the order-giving body to order-receiving body. Beijing, like Shanghai, Tianjin and Chongqing, is a provincial municipality or a city state, so the province level is at the same level and the municipal governments of these cities report to the state government (the national level) directly.

Figure 1 Territorial ranks in urban China

Every agency or bureau within the government structure is given a rank. The units with the same rank can not issue orders to each other. Only the higher ranking agency can issue an authoritative order to the lower ranking agency. For example, the Ministry of Construction has the same ranking as the Beijing Municipal government. So the Beijing Municipal government can not issue orders to the Ministry of Construction, or the other way around. Instead the communication should go up and down to the next level. It would also be rare for the provincial government to issue commands to the town level skipping the municipal and district levels.

4. Water management at the State and Municipal level

The State Council and National People's Congress are at the top level, commissions are a step down, ministries are another step down, and bureaus are another step down. The State Development Planning Commission (SDPC) is responsible for 1) formulating and implementing strategies of national economic and social development, 2) arranging construction projects funded by central government appropriation, key construction projects, and foreign-funded key projects, 3) organizing and managing the work of special inspectors for key projects, 4) the approval of all infrastructure projects. It is also the source and manager of capital funds for government sponsored investment projects and those of most state owned enterprises. It is also a functional agency with local level representations.

Municipal Governments in China are responsible for planning, surveying, designing, constructing, operating, and managing irrigation, drainage, flood control works, and rural hydropower. They are also responsible for county and municipal tasks such as constructing and maintaining canals, related irrigation and flood control structures, medium-sized reservoirs. At the municipal level a number of institutions are involved, as will be explained for Beijing below.

In the old structure at the city level the Municipal Administration Committee is there primarily to guide, coordinate, supervise and inspect land, environmental protection, water supply and other infrastructure within the city. The Price Bureau is responsible for implementing price policies and laws and to supervise and monitor the price of commodities and services. The Urban Planning Administration Bureau is mostly responsible for the urban

planning and design. It contributes to the design and organization of urban space and activity. And it is responsible for the approval of the initial project construction.

The Public Utilities Bureau (PUB) is responsible for managing all municipal public utilities, such as gas supply, heating supply, transportation, water saving, etc. For the water sector, PUB is in charge of collecting water fees and supervising the municipal waterworks company and municipal water saving office. However, Beijing's water governance has recently been reformed.

5. Water management in Beijing: structure and policy making

For water management in Beijing, there are three layers from the municipal to town levels (shown in table 1). Each one has its own authority with corresponding responsibilities. At the lowest level it is mainly a Water management station with limited autonomy for the area covered.

The hierarchical water governance structure is caused by the complex system of state level ministries, agencies and lower level bureaus involved. It leads to an unclear policy making process. Finding out how policies are made in China is much like tracing the movement of a single blood cell through the entire human body: the journey is time consuming and involves a network of organs, and the specific route depends on the situation (Hou, 2000). On top of a rigid hierarchical structure, the cooperation between agencies at the same hierarchical level is very poor.

Table 1 Three layers for water management of Beijing

Municipal Level	Beijing Water Authority	Responsibilities: Water resources, water supply and water pollution management and etc. within the municipality. Coordinating among districts/counties
District/County level	District/county Water Authority	Responsibilities: Water resources, water supply and water pollution management and etc. within the district/county. Coordinating among subdistricts/towns
Subdistrict/Town level	Subdistrict/town Water Management Station	Responsibilities: Water resources, water supply and water pollution management and etc. within the area

Source: Pan (2006).

Quantitative measurement of the relations between the different organizations involved, like was tried in the Switch cities of Accra and Alexandria, was not possible in the case of China. There is no tradition of empirical social science type of research. Secondly government officials interviewed will not give their opinions about the functioning of the governance structure, but rather repeat the official point of view on the division of power between the different levels of government. For that reason we mainly rely on the analysis of the administrative structure of the country and the views expressed in the literature, in which case we give the references.

6. Major stakeholders in the water and sanitation sector in China

State Environmental Protection Agency (SEPA)

Some agencies exist with the particular functions. SEPA was set up as a Ministry in March 1998 when the original Environmental Protection Agency was upgraded from a sub-ministry to a ministry. The responsibility of SEPA is 1) the environmental supervision and management, 2) administrative inspection of the environmental protection, 3) environmental statistics and information collection, 4) formulating general and specific policies, laws and regulations, and administrative rules for environment protection and environment impact assessment, 5) coordinating and organizing pollution prevention (source from website of SEPA).

Environmental norms have been put at a high level in China, but unfortunately they are not always applied seriously. The SEPA is not very powerful, compared to the Ministry of Construction which is responsible for the construction of water and sanitation facilities and follows a very technical approach.

SEPA like other state level organizations has corresponding agencies or bureaus at provincial, municipal, county and district levels. For example, there are State Environmental Protection Agency (SEPA), Provincial Environmental Protection Agency and Urban Environmental protection bureaus. SEPA is responsible for the Provincial Environmental Protection Agencies, which in turn control the Urban Environmental Protection Bureaus. The leader of SEPA can appoint the leader of the Provincial Environmental Protection Agency. These functional agencies exist with different territorial ranks. So in different provinces or cities, the functional agencies concerned with the water services and resource governance are almost the same.

The Ministry of Construction

The Ministry of Construction is responsible for the overall administration of the construction sector. In the water sector, it is responsible for the planning and construction of municipal water systems, including sewers and treatment facilities, and for formulating the policies, regulations and administrative rules concerning construction of facilities.

The Ministry of Construction is a typically a functional department that has a local counterpart, the Beijing Urban Construction Bureau. The Beijing Water Conservancy Bureau, and the Beijing Environmental Protection Bureau are other examples of local counterparts of national level institutions.

The Ministry of Water Resources

The Ministry of Water Resources is responsible for 1) the management of all national water resources, including improving and developing major rivers, 2) planning and supplying water to urban centres, 3) constructing irrigation facilities, soil and water conservation programs, 4) supplying rural hydropower, 5) building and managing medium-size and large reservoirs for flood control.

Non governmental organizations

Non governmental organizations in the water sector are scarce, except for the World Wild Life Fund (WWF), which is very active (WWF, 2005 and CICODE, 2006). Liang-Yin Hau (2007: 384) notes that it is "a long march towards civil society" in China. Referring to the issue of

HIV/AIDs the author notes that NGOs are allowed more influence, but a genuine partnership between NGOs and the government may still be far off, given the political reality in China.

The private sector

The private sector is not so much involved in the water and sanitation sector in China, except sometimes through building contracts. Also a number of investments are financed through Build Operate and Transfer (BOT) formulas, where the national investors have now replaced the international companies to finance these projects.

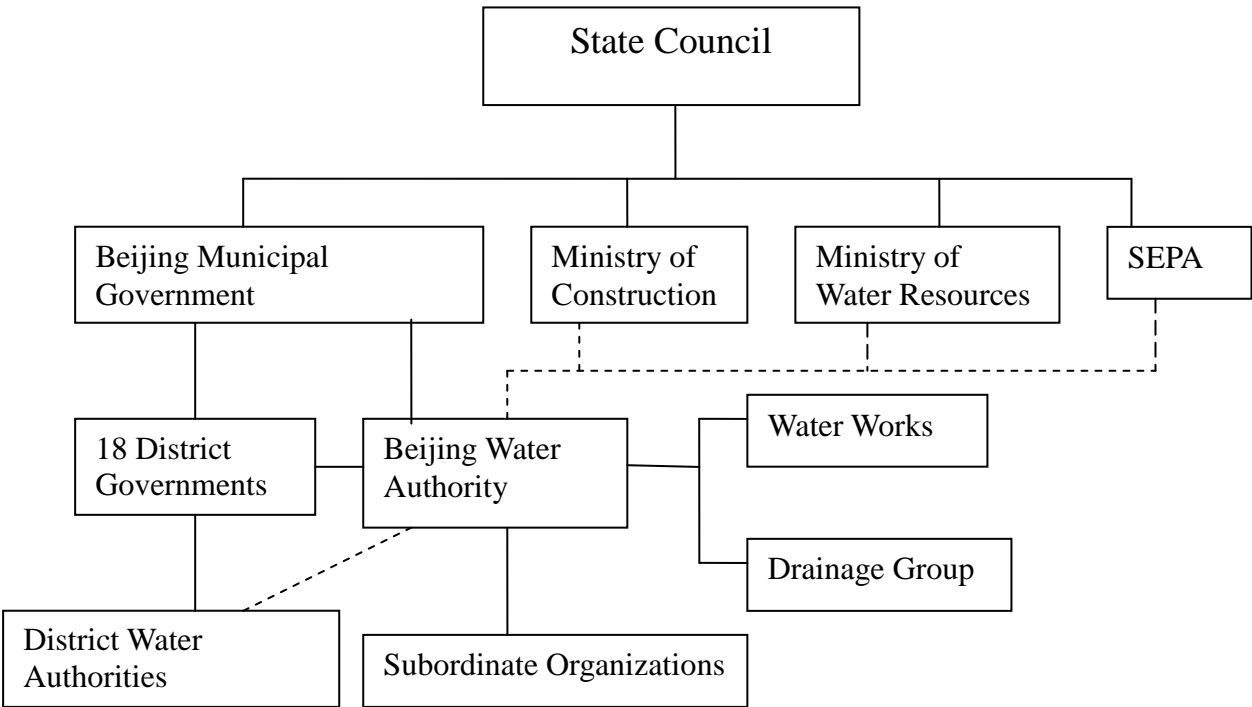
7. Changes in the water governance structure in Beijing: BWA

China has reformed the water governance structure. The purpose of the reform is to reduce the number of agencies and bureaus involved in water management. The Beijing Water Authority (BWA) is a new institution for water resources and services management. It is expected to be in charge of water service and management in the different territories. Such an authority is established in many other cities and provinces as well at the moment.

Recently a number of changes in the water governance structure have been implemented, starting in Beijing. Figure 2 (attached) shows the old water governance structure of Beijing. It reflects the hierarchical order in the water sector and shows all kinds of agencies involved in water management in Beijing.

Figure 3 shows the new structure for water governance in Beijing. It reveals that only the three most relevant agencies: Ministry of Construction, Ministry of Water Resources and State Environmental Protection Agency and the Beijing Municipal Government are involved in the water management. The Beijing Water Authority was established in 2004 and is owned by Beijing Municipal government.

Figure 3 New water organization of Beijing



Source: Pan (2006).

The Beijing Water Authority has taken over the role of a number of bureaus shown in figure 2. The Beijing Water Authority has two main organs: Water works and Drainage group, and also commands the 30 subordinate organizations. The explanations of the functions of the new organs are described after table 2. Due to the territorial hierarchy, the 14 District Water Authorities are all under the Beijing Water Authority. In total there are 18 district governments in Beijing. Except for four districts in the city centre, the other 14 districts have separate water authorities. The names of Districts and District water authorities are given in table 2.

The new water governance structure of Beijing is the example for other Chinese cities and provinces. According to the hierarchical structure, there will be Provincial water authorities, Urban water authorities, and District or County level water authorities. However, it is a big challenge to change the existing governance structure entirely in China. Even Beijing has not yet completed the water governance structure reform process. We will now give the responsibilities of the new authority and the two groups that have been formed under its authority.

Table 2 District governments and district water authorities in Beijing

	District Governments	Water Authority
1	Dongcheng District (东城区)	
2	Xicheng District (西城区)	
3	Chongwen District (崇文区)	
4	Xuanwu District (宣武区)	
5	Chaoyang District (朝阳区)	Chaoyang Water Authority
6	Haidian District (海淀区)	Haidian Water Authority
7	Fengtai District (丰台区)	Fengtai Water Authority
8	Shijingshan District (石景山区)	Shijingshan Water Authority
9	Mentougou District (门头沟区)	Mentougou Water Authority
10	Fangshan District (房山区)	Fangshan Water Authority
11	Tongzhou District (通州区)	Tongzhou Water Authority
12	Shunyi District (顺义区)	Shunyi Water Authority
13	Daxing District (大兴区)	Daxing Water Authority
14	Changping District (昌平区)	Changping Water Authority
15	Pinggu District (平谷区)	Pinggu Water Authority
16	Huairou District (怀柔区)	Huairou Water Authority
17	Miyun County (密云县)	Miyun Water Authority
18	Yanqing County (延庆县)	Yanqing Water Authority

The Beijing Water Authority

The Beijing Water Authority was newly established in May 2004. There are 14 district or county water authorities and 26 sub-district or town water management stations, which are all managed by Beijing Water Authority. The responsibility of Beijing Water Authority is 1) to formulate the policy, regulation and administrative rules on water management, 2) to formulate the regulations on water tariff and wastewater fee, 3) to supervise the water services and the standard of technology, 4) plan and organize the water supply and water allocation, 5) manage the institutions concerned with the wastewater discharge and reclamation.

The Beijing Waterworks Group

The Beijing Waterworks Group (BWG) is the only tapped water supplier in the Beijing area and is responsible for the supply of the urban areas as well as seven other suburbs of Beijing. There are about 20 drinking water factories that can supply more than 2.93 million m³ per day with an annual production in excess of 700 million m³.

The Beijing Drainage Group

The Beijing Drainage Group (BDG) is a wholly state-owned wastewater utility established in February 2002. The principal activities of the BDG are the collection and treatment of sewage as well as reclamation of treated wastewater, aiming at water pollution control and effective management of water resources (from website of BWG, see below).

8. The Switch approach

Global changes such as climate change and volatility, urbanization and industrialization, population growth, urban sprawl, rural-urban migration put pressure on cities. A sustainable urban water system is a basic feature of an ecological city, but is it enough? The Switch project (Sustainable Water Improves Tomorrow's Cities' Health) with support from the EU is seeking a paradigm shift in urban water management. Its purpose is to make water treatment more sustainable and protect the quality of drinking water sources. Also it wants to reduce risks such as water related diseases, droughts and flooding. The project, according to the Switch proposal, intends to improve water governance and to translate scientific innovations into improvements of day to day management of urban water and sanitation.

Water stress can be noted in many countries (Seckler et al., 1998). A deteriorating environment accelerates the trend towards a gradual shortage of fresh water. While freshwater supplies are clearly limited, for most people water scarcity is caused by competition between water uses and by political, technological and financial barriers that limit their access to water (Falkenmark and Lundqvist, 1998). The Switch program intends to generate new efficiencies from an integration of actions across the urban water cycle in order to improve the quality of life in cities.¹

Switch emphasizes the importance of integrated water resource management. The approach is very much focused on closing the urban water cycle, defined as the link between the resource, its use for drinking water and the eventual reuse to allow the water to flow back in the resource. From the literature we know the re-use is currently at a price of 40 euro cents per m³, while desalted water may cost around one euro per m³. Unfortunately the latter is always produced at the sea level, implying transportation costs in most countries.

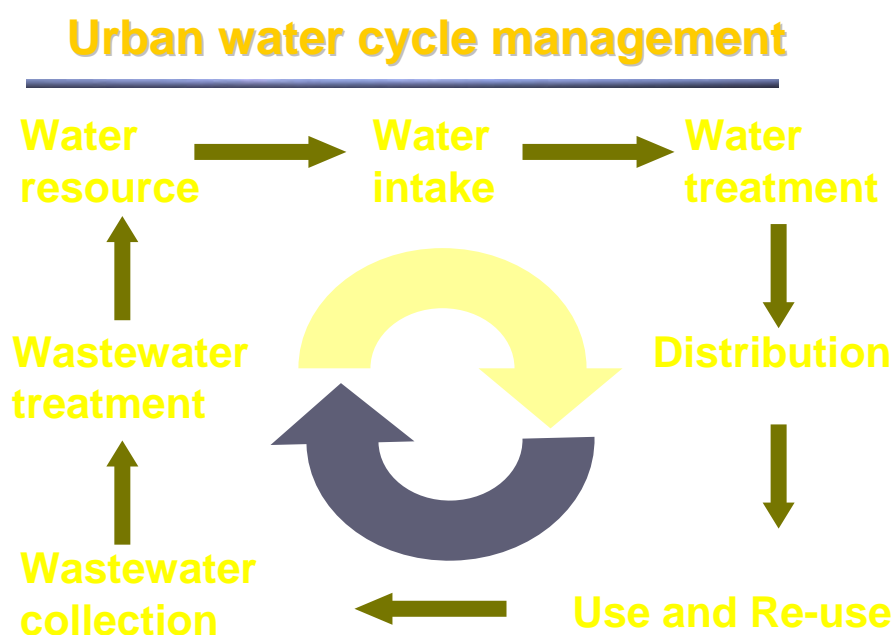
The Switch approach has three characteristics:

1. It relates storm water to drinking water and water treatment
2. It emphasizes a more ecological approach and
3. It emphasizes a more integrated approach to the different water related issues.

Our point of departure is the idea of closing the water cycle. In Singapore no water gets lost between the resource, the use for drinking water and the treatment and reuse. This is illustrated in the following figure 4. Each flash in the figure represents a point where costs are made and revenues can be obtained. It is also possible to deal with the process in an integrated way, like they do in Singapore. In that case the costing and charging could also be integrated in one exercise (for the costs) and one bill for the customers.

Strigl (2003) stresses that a real improvement in eco-efficiency requires a fundamental change in culture, structure (institutions) and technology. Switch intends to develop, apply and demonstrate a range of scientific, technological and socio-economic solutions that will be tested to determine their contribution to the achievement of sustainable and effective urban water management schemes. It implies a multi-disciplinary approach in Switch, i.e., the integration of the technological means, socioeconomic aspects, environmental concerns, and health considerations.ⁱⁱ

Figure 4 The closed water cycle, showing where costs and revenues can be expected



Source: Van Dijk (2007).

Our research under Switch WP 6.4 is summarized in box 1, focusing in particular on a case study undertaken in Wuhan in November 2007 with Xiao Liang.

Box 1 Research under Switch by Working package 6.4

WP 6.4 explores the social, economic and environmental implications of alternative technologies in urban water systems. It intends to make estimations of the efficiency and sustainability of the alternative technologies. Cost benefit analysis and Life cycle analysis are methods used for the evaluation. Wuhan in China is one of the cities to be the studied, in particular a neighbourhood where wastewater treatment and reuse in the neighbourhood will take place. A comparison will be carried out between the “new” technology (decentralized wastewater treatment) and the “old” technology (centralized wastewater treatment system) to help decision makers to develop and select efficient and sustainable technologies for their water systems.

Source: Van Dijk (2007).

Limited research is carried out in Beijing because of all the preparations for the Olympic games. However, an urban agriculture project has started and also looks at rain water harvesting. Examples of eco sanitation are studied, but setting up a learning alliance turned out to be difficult in such a big city with already a very hierarchical water governance structure. During a first mission it was concluded that it would be difficult to develop two full blown learning alliances for Beijing and Chongqing, where demonstration activities are envisaged. The country is big, the two cities have 15 and 12 million inhabitants each and are 1500 km apart. There are powerful actors who are used to dominate such networks and outspoken research partners who have defined already exactly what they want to do. In a lighter form the learning alliance could serve the purpose of information exchange and coordinated dissemination of alternative ideas concerning the urban water cycle or ecological cities. In a later stage, the activities of the learning alliances could be further intensified.

Potential research activities in Beijing concerning a visioning workshop and the study of some decentralized waste water treatment facilities.ⁱⁱⁱ Other work packages are looking at aquifer refilling and at river bank infiltration experiments.

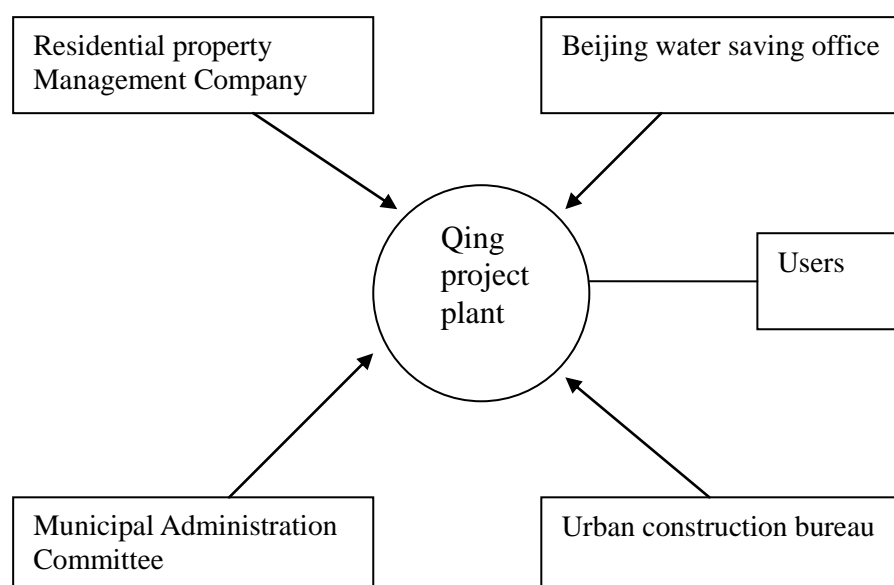
9. The institutional analysis for three demo projects

1. *Beijing Qing grey water reuse project*

As a brief description of the project we provide six characteristics and illustrate the institutional setting in figure 5:

- a. Location: city center
- b. Function of project: water reclamation and reuse
- c. User: resident
- d. Function of water: toilet flushing and green watering
- e. Production scale: 60 m³/ day
- f. Subsidies: initial investment

Figure 5 The stakeholders of the Qing projects



There are five main stakeholders involved in the Qing project. Both the Residential Property Management Company and Beijing Water Saving Office play important roles on management of the Qing plant. Below is the description of the relevant stakeholders.

1.1 Residential Property Management Company

Residential Property Management Company is in charge of the operation and maintenance of the Qing plant. All cost and profit of the Qing plant is managed by the company. It can inform other stakeholders the status of the Qing project.

1.2 Beijing Water Saving Office

Beijing water saving office belongs to Beijing Water Authority, which is responsible for supervising the water services and the standard of technology. It provides subsidies to the initial investment of water reclamation system. Almost all the water reclamation systems of Beijing are subsidized around 50-100% of the initial investments by the Beijing Water Saving Office.

Moreover, the BWA is in charge of checking the quality of reused water of the Qing project. Generally the Residential Property Management Company takes reused water samples to relevant institutes for quality testing, and then sends the report to Beijing Water Saving Office. This happens twice each year. If the water quality can not reach the standard requirement, the Beijing Water Saving Office will provide technical assistance or criticize the project management institutes.

1.3 Municipal Administration Committee

The responsibility of the Municipal Administration Committee is to supervise land use and environmental protection. It is involved in formulating the policy of construction standards of water reclamation plants.

1.4 Urban construction bureau

It is also involved into formulating policy of construction standard of water reclamation plant and supervising the plant construction.

1.5 Users

There are around 2500 users in the Qing system. The users are all the residents in the Qing residential area. Since some people think the reclaimed water is too dirty to be used for toilet flushing, around 20% residents refuse to use the reclaimed water from the Qing project.

The price of the reused water is supposed to be lower than the price of the municipal water. However, the operational cost of the Qing plant is so high that the reused water has the same price as municipal water. So the users don't find any benefit of using reused water instead of municipal water.

2. The Beijing Normal University grey water recycling project

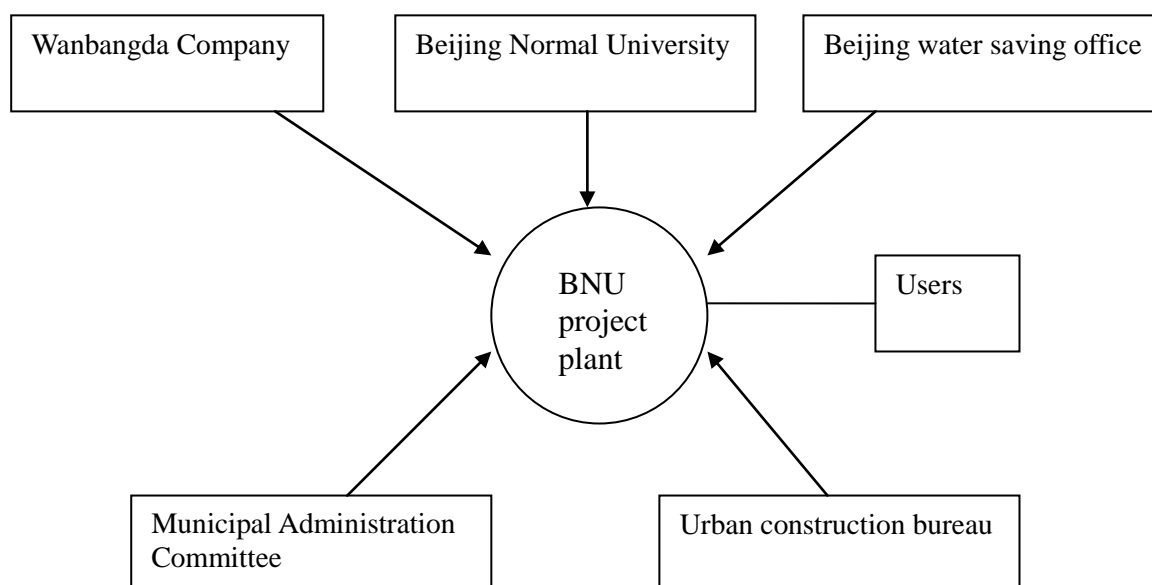
This is a similar project with the following characteristics. The institutional embedding is provided in figure 6:

- a. Location: city center
- b. Function of project: water reclamation and reuse
- c. User: students
- d. Function of water: toilet flushing and green watering
- e. Production scale: 600 m³/ day

f. Subsidies: initial investment

The stakeholders of the BNU project are similar to that of the Qing project. But for the BNU project, there are three crucial stakeholders which are Wanbangda Company, Beijing Normal University and Beijing Water Saving Office. Because the functions of Beijing Water Saving Office, Municipal Administration Committee and Urban construction bureau are the same as the previous description, they are not described here.

Figure 2 The stakeholders of the BNU projects



2.1 Wanbangda Company

The main responsibility of the Wanbangda Company, which has some kind of management contract, is construction, operation and maintenance of the BNU project. All information of the plant could be obtained from the company. The Wanbangda Company is a state owned company, which belongs to the Beijing Normal University. The relation between the Wanbangda Company and Beijing Normal University determines the financial status of the BNU project.

2.2 Beijing Normal University

The owner of the BNU project is the Beijing Normal University, and the manager of the project is Wanbangda Company. So all cost and benefits of the project are managed by Beijing Normal University.

2.3 Users

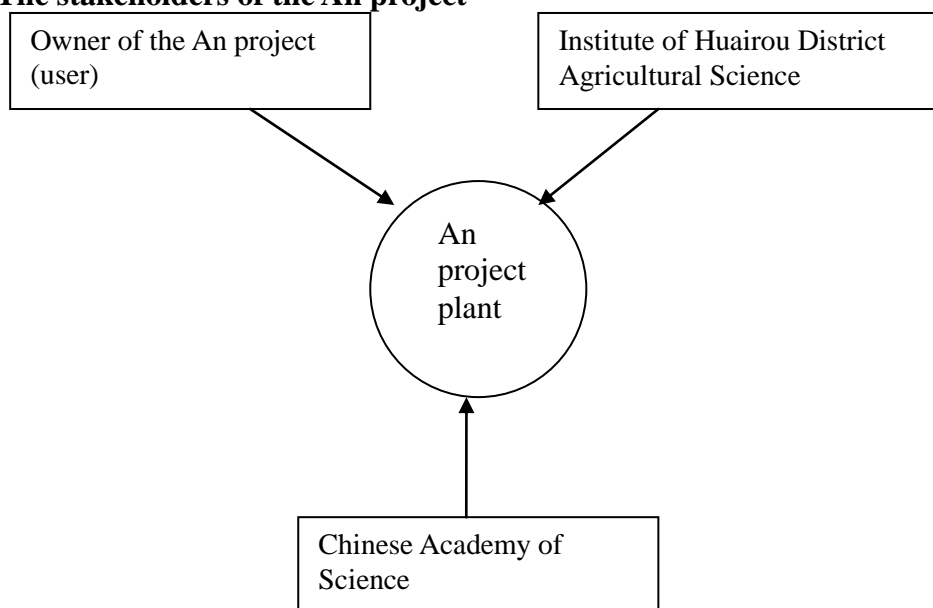
The users of the BNU project are the students and staff of Beijing Normal University. Most of the users accept to use reclaimed water for toilet flushing. There may be three reasons for it. Firstly, the student being young generation can accept the new thing easily. Secondly the reclaimed water is used in student dormitories, which is different from homes, so the students don't pay much attention to the water. Thirdly, they don't have to pay for the water.

3. The An rainwater harvesting project

The An project is located in Beijing rural area and is about rainwater harvesting, the stakeholders involved into the project are different from the other two projects. Below is the description of the stakeholders. It has the following characteristics:

- a. Location: rural area
- b. Function of project: rainwater harvesting and reuse
- c. User: project owner
- d. Function of water: agricultural irrigation
- e. Production scale: 400 m³/ year
- f. Subsidies: 60% of initial investment

Figure 6 The stakeholders of the An project



3.1 Owner of the An project

The owner of the An project is also the user of the An project. They are in charge of construction, operation and maintenance of the project. The cost and benefits of the project are managed by the owner.

3.2 Institute of Huairou District Agricultural Science

The responsibility of the Institute of Huairou District Agricultural Science is facilitating agricultural development. It offered 35% of the initial investment to the An project. It helps to supervise the construction of the project. Moreover, it provides technology assistance on the operation of the project.

3.3 Chinese Academy of Science

Because it is a demonstration project, the research institute would involve into the project. The Chinese Academy of Science subsidizes around 35% of initial investment on the project. Also it provides technology assistance on the operation of the project.

Excepting for the manager (owner) of project, two main stakeholders are involved into management of a decentralized water treatment system. The Beijing Water Authority and the Beijing Construction Bureau. The Beijing Water Authority is in charge of water service

quality and the Beijing Construction Bureau is responsible to plant construction standards. However, in the rural area, there are no institutes monitoring the water quality nor the quality of the construction.

10. Conclusions

Water governance is complex, but we conclude that in China the structure for water management is relatively simple and hierarchical, but not very participatory. The key is that the facilities are not owned and managed by local authorities, which makes the ownership vague and hinders innovative local technical solutions, innovative ways of financing (there are some examples of BOTs however) and means very little cost recovery is currently achieved. The cost for water treatment are recovered through the drinking water bill, the amounts charged are insufficient, however.

Secondly, the scale of the issues is often beyond our experience. Organizing water and sanitation for 15 million inhabitants in Beijing is the same as trying to run the whole sector through one organization in the Netherlands, which counts 16 million inhabitants spread over a much larger area. It will be important to find out whether decentralized small scale water treatment is cheaper and more ecologically friendly than the current system of large scale centralized water treatment. The urgency of the problems in China has led to innovative solutions, but the emphasis has been on river linking rather than on desalination.

There are a large number of initiatives for more ecological cities (Van Dijk, 2007), ranging from simple water and sanitation technologies for the western part of the country (a Dutch project) to sophisticated ecological projects in the framework of Beijing 2008. The method of constructed wetlands requires too much land for most Chinese cities, in that sense river bank infiltration may be an alternative, given the space for the rivers is there. Private developers are looking for new ideas concerning drinking water and sanitation, but are mainly interested in cost savings and attractive options for their projects.

The Chinese authorities have a preference for large modern high tech solutions, even if they know they can not always manage the technology properly. They are less willing to pay for management support, training or software, while given the high energy use per unit of GDP and the huge water consumption in per capita terms there is scope for improvement of the efficiency of the system through better management.

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Notes

¹ Nine cities around the world serve as demonstration cities and a learning alliance framework will be established in each demo city. Through the learning alliance platform, the barriers to information sharing are broken down and the process of technological and institutional innovation is speed up.

¹ The current research project WP 6.4 is part of Switch. The emphasis is on the financial and economic analysis of urban water management in demo cities.

¹ Mels made available two interesting studies of the current situation with respect to drinking water and decentralized wastewater reclamation systems in Beijing (Zhang, 2006 and Shujie, 2004).

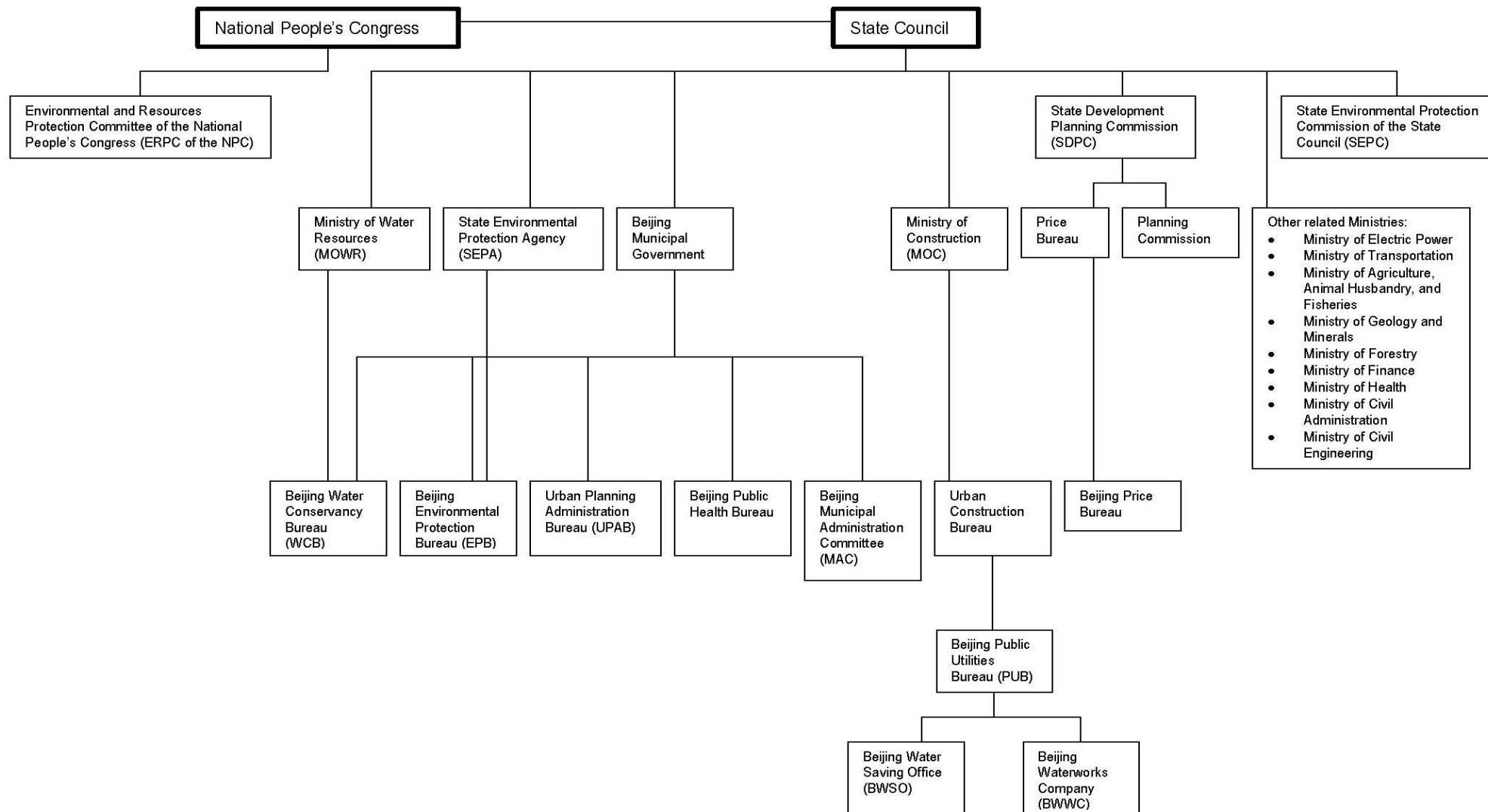


Figure 2 Organization of water relative governance in Beijing Source: Hou (2000).

Appendix 4.3 Accra

Integrated Urban Water Management in Accra: Institutional Arrangements and Map

Bertha Darteh, Marieke Adank, Kwabena S. Manu

August 2010

Executive Summary

This report is a contribution to SWITCH Project deliverables under work package 6.1 which looks at Institutional arrangements for Integrated Urban Water Management. It presents the results of the study undertaken to map out institutional arrangements for urban water management in Accra, one of the SWITCH demonstration cities. The study builds on an initial scoping exercise and a stakeholder analysis which included stakeholder consultations and profiling which identified relevant Government Ministries and Departments, local authorities, NGOs, Donor community representatives and water users.

The institutional mapping was guided by protocol given by Green (2007) which states that Institutional maps are intended to provide an overview of institutional and governance structures for the management of urban water; focussing on the key actors or players and their interactions, where power is located, who has the ability to influence decisions, and who makes decisions. The study considered Water Supply, Waste Water Management and Storm water Management under the relevant areas of policy, legislation, planning and financing, regulation as well as service provision. The role of the “informal” sector was also considered.

The study shows that while there are various policies and laws regarding these different aspects of urban water management, there is no explicit policy on integrated urban water management (IUWM). There is however room for such an explicit policy because integrated water resources management is an existing policy direction. Two significant challenges are noted: 1) the difficulties in enforcing laws and implementing plans of actions, and 2) the way institutions are organised acts as a barrier to integrated urban water management due to the inadequate coordination among sector institutions.

Recommendations are made regarding the formation of a coordination platform which can bring together the different stakeholders in different areas to jointly plan towards integrated urban water management in the city of Accra.

Full report available at <http://www.switch.watsan.net/page/4304>

Appendix 4.4 - Belo-Horizonte

Governance of urban environmental sanitation: a case from Belo Horizonte, Brazil,

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August 2008.*

Executive summary

Although many cities in Latin America have advanced in provision of water supply services, environmental sanitation services provision has lagged behind. These sanitation challenges need to be addressed within a framework of Integrated Urban Water Management (IUWM), given the fact that the different elements of environmental sanitation, such as sewerage and stormwater drainage, are inter-related, with potential externalities within the city, as well as at catchment level. It also means that there will be a range of stakeholders with different, often divergent, interest, who will try to articulate these within the existing governance framework. In the region, various governance modalities around environmental sanitation are emerging, as the cities are addressing sanitation issues. The SWITCH Project aims to strengthen IUWM, amongst others, by promoting improved governance through a so-called Learning Alliance approach. This paper aims to analyse the actual governance framework in one of the SWITCH cities: Belo Horizonte, Brazil. The main challenge of the urban water complex lies in the drainage of stormwater and wastewater. The intense urban growth during the 1970s led to huge impacts on water quality in receiving bodies and an increase of flood risk. Since then, a change in paradigm to drainage has been occurring, making better use of natural drainage courses, by improving urban creeks, detention ponds, wetlands, and investments in wastewater interception and treatment. This change in paradigm has been facilitated and reinforced through the democratization of decision-making processes on sanitation. The city of Belo Horizonte has seized the opportunities of decentralization, and tried to democratize its entire governance structure, including around sanitation. One of the clearest manifestations of that is the establishment of platforms and mechanism for participatory strategic planning of sanitation. These have allowed for more integrated investments, which are responsive to the priorities of citizens. In addition, it has increased transparency, and proved to be instrumental in raising external funds for investments in sanitation. Governance over operational decision-making processes and O&M could still be improved. While some programmes and units have developed and piloted methodologies for participatory planning of interventions, others are lagging behind. One of the reasons for this lag is that traditional engineering approaches and skills are still common among staff. Also, governance over sanitation issues that cross the city boundaries could be strengthened. The catchment committee, with its management instruments, has the potential to support municipalities in achieving more integrated water management. Yet, these instruments are not yet well-developed, nor applied. Also, at metropolitan level, mechanisms for cooperation and joint decision-making on sanitation issues, are not institutionalised.

Full report at <http://www.switch.watsan.net/page/3261>

Appendix 4.5 Cali

An English synthesis of the Cali report is contained in the Comparative Institutional Analysis, Latin America, available at <http://www.switch.watsan.net/page/4304>

Given the challenges of accurately translating complex and country specific institutional terminology from one language to another, the executive summary in Spanish below is for the benefit of interested Spanish Speakers, followed by the a link to the main report in Spanish.

Gobernabilidad e infraestructura hídrica urbana; un caso de estudio de Cali, Colombia

Por: Stef Smits (IRC), Alberto Galvis (Cinara/Universidad del Valle), Diana Paola Bernal (Cinara/Universidad del Valle), Diana Amparo Cardona (Cinara/Universidad del Valle y Jan Teun Visscher (IRC) Cali, Colombia,

Septiembre 2008

Resumen ejecutivo

Aunque en las ciudades en América Latina ha habido avances importantes en la prestación del servicio de agua potable, los servicios de saneamiento ambiental se han quedado atrás. Enfrentar los desafíos de saneamiento requiere de un enfoque enmarcado dentro de una Gestión Integrada de Aguas Urbanas (GIAU), dado que muchos aspectos de saneamiento ambiental son inter-relacionados, con posibles externalidades dentro de ciudades y a nivel de cuenca. Requiere de formas de gobernabilidad que permiten a los diferentes actores de articular sus respectivos intereses, que muchas veces son divergentes, en procesos de toma de decisiones. El Proyecto SWITCH busca mejorar la GIAU, entre otros a través de promover una mejor gobernabilidad del agua. El objetivo de este informe es desarrollar un mejor entendimiento sobre la gobernabilidad local actual sobre el saneamiento ambiental en una de las ciudades donde el Proyecto SWITCH está operando: Cali, Colombia. Cali enfrenta dos desafíos principales en su gestión de aguas urbanas:

- Mejorar el *servicio* de agua potable, en términos de continuidad del servicio, disminución del riesgo en el agua de consumo y expansión a futuras áreas residenciales
- Controlar la contaminación de los cuerpos receptores de agua, particularmente, del río Cauca; principal fuente de abastecimiento de la ciudad.

Estos son relacionados, dado que las mejoras en el servicio de agua potable, requieren que se reduzca la contaminación en el río Cauca, como principal fuente de agua potable. La calidad del agua del río Cauca es afectada por diferentes factores, incluyendo alcantarillado, vertimientos de aguas residuales y residuos sólidos. Están dentro de la competencia de diferentes instituciones El estudio mostró que el marco institucional tiene un cierto grado de fragmentación, sobre todo en la gestión ambiental, lo cual limita una gestión integral de recursos hídricos a nivel de cuenca. Pero, la fragmentación en sí mismo no es el gran limitante para lograr la GIAU. Más bien, está en el hecho que no existen mecanismos para integración y coordinación entre las diferentes instituciones. Eso se refleja en los procesos de planificación. Aunque existe una verdadera “cultura de

planificación”, los planes son institucionales y sectoriales. Las causas para la poca integración entre instituciones en la toma de decisiones incluyen:

- Poco liderazgo para lograr una visión común y una planificación armonizada entre las diferentes instituciones locales y regionales
- Poca conjugación entre la toma de decisiones políticas con lo técnico.
- Falta de aprovechamiento de los mecanismos de participación ciudadana en la planificación, por el limitado papel y capacidad de la sociedad civil organizada

A pesar de estas limitaciones, existe interés de las instituciones y representantes de la comunidad en mejorar la planificación armonizada alrededor de la GIAU. El Proyecto SWITCH está contribuyendo a eso, brindando un espacio para una planificación compartida entre instituciones, entre los sectores políticos y técnicos y con participación ciudadana. Este espacio debe ir acompañado por una estrategia de fortalecimiento de 3 capacidades, tanto de los funcionarios de las instituciones, como de la comunidad, para participar en procesos de planificación participativos e integrales.

Full report in Spanish at <http://www.switch.watsan.net/page/3261>

Appendix 4.6 Hamburg

The original IM report for Hamburg was completed in German in May 2009, and later translated into English in a shorter form. Both versions are available.

Institutional Framework for Water Management in the German Federal State of Hamburg

Jochen Eckart

January 2011

Summary and Outlook

Summary

The institutional setting for water management in Hamburg is complex. There are several different factors which explain how these institutional structures arose.

On one hand, the historical growth and development of institutions and structures has to be taken into account. From the very start of land reclamation along the river in the middle ages, there have been organizations which oversee management of the region's water and earth resources, as well as ones responsible for the dykes along the rivers. Other aspects of the complex institutional setting behind these issues have arisen because of divisions between different disciplines, e.g. between urban planning and technical environmental protection. In addition, different institutional reforms have been carried out in recent years. As a result, the institutions, authorities, boards and bodies were not created in one fell swoop, but they came to be in different ways over time.

In addition to this, private organizations and related groupings have now begun to play an increasing role with regard to water management in Hamburg. These include the water company Hamburger Wasserwerke, drainage company Hamburger Stadtentwässerung, the Hamburg Port Authority, and LSBG. All of these are structured as privately managed bodies, though financial privatization is not really the focus of their activities: Their organizational structures are associated with private enterprises and are an attempt to improve efficiency when carrying out the tasks at hand.

Two basic models dictate how responsibilities are allocated regarding water management. On the one hand, tasks are grouped according to the features in the physical environment, i.e. flood protection duties are divided up between the different rivers and sections of the riverfronts. This ensures that duties are integrated and focused. On the other hand, responsibilities for water management are also allocated according to the tasks that need to be done, as is necessary in the case of water disposal, for example. Duties which pertain to the same matter can be grouped together within administrative structures. This task-oriented distribution of responsibilities, based on related technical aspects, is intended to make administrative structures clearer to outsiders. However, problems arise with the different areas of responsibility, e.g. decentralized rainwater management, and lead to an overlap between feature-related responsibilities and task-related responsibilities.

Outlook

In 2010, BSU joined forces with Hamburg Wasser to create the RISA project for adapting the rainwater infrastructure. RISA's aim is to plan for and tackle the predicted increase in precipitation as a result of climate change.

The project's aim is to maintain the existing high levels of water disposal efficiency, guarantee and improve flood protection along waterways and internal bodies of water, and to define targets for a water management system that is as close to nature as possible. To achieve these objectives, integrated solutions regarding water management are to be established and be better integrated in planning and development.

Along with technical and issue-related contents, planning and communication procedures dealing with the issue of rainwater management should be optimized, and cooperation on the administrative level should be improved. To achieve this, the legal, institutional and financial framework in Hamburg will be analyzed and, if necessary, suggestions for modifications will be produced. The results of the project are to be included in a "rainwater structural plan" that will, over the next few years, form a guideline for any actions undertaken by administrative bodies, specialists and property owners with regard to rainwater management within Hamburg. Taking its cues from 1990's structural plan for water disposal and waterway protection (FHH 1990), the rainwater structural plan should both illustrate the current state of rainwater management in Hamburg, outline targets for future approaches to rainwater and sketch the necessary technical solutions, as well as how procedures, participation and information are structured on the administrative level. These contents can be supplemented by the addition of necessary legal or institutional revisions.

Fuller report in English at <http://www.switch.watsan.net/page/4304>

Institutionelle Rahmenbedingungen der Wasserwirtschaft in der Freien und Hansestadt Hamburg,

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May 2009

Full report in German at <http://www.switch.watsan.net/page/3261>

Appendix 4.7 Lima

An English synthesis of the Lima report is contained in the Comparative Institutional Analysis, Latin America, available at <http://www.switch.watsan.net/page/4304>

Given the challenges of accurately translating complex and country specific institutional terminology from one language to another, the executive summary in Spanish below is for the benefit of interested Spanish Speakers, followed by the a link to the main report in Spanish.

Gobernabilidad e infraestructura hídrica urbana; un caso de estudio de Lima, Perú

Por: Stef Smits (IRC), Alain Santandreu (IPES), Ernesto Bustamante (IPES), Gunther Merzthal (IPES), Alicia Román, Rafael Muñoz (MVCS) y Jorge Barriga (MVCS) Lima, Perú, Junio 2008

Resumen ejecutivo

Aunque las ciudades en América Latina ha habido avances importantes en la prestación del servicio de agua potable, los servicios de saneamiento ambiental se han quedado atrás. Enfrentar los desafíos de saneamiento requiere de un enfoque, enmarcado dentro de una Gestión Integrada de Aguas Urbanas (GIAU), dado que muchos aspectos de saneamiento ambiental, como alcantarillado y tratamiento de aguas residuales son inter-relacionados, con posibles externalidades dentro de ciudades y a nivel de cuenca. También implica que una serie de actores tiene intereses en el tema, y tratarán de articularlos en procesos de toma de decisiones. En la región varias modalidades de gobernabilidad sobre saneamiento ambiental están surgiendo en la medida que las ciudades están afrontando estos desafíos. El Proyecto SWITCH busca de mejorar la GIAU, entre otros a través de promover una mejor gobernabilidad, a través de las llamadas Alianzas de Aprendizaje. Como la segunda ciudad más grande ubicada en un desierto, Lima enfrenta grandes desafíos en su gestión de agua. Necesita aumentar la cobertura en agua potable a cerca de un millón de personas. Con este incremento en abastecimiento de agua, se aumenta también la necesidad de colección y tratamiento de agua. Además, se está contemplando la posibilidad de reuso del agua residual para áreas verdes y agricultura urbana. Esta situación genera varios posibles escenarios de inversión en infraestructura, que son de alta complejidad. El presente informe tiene como objetivo de analizar la gobernabilidad actual sobre el saneamiento ambiental, para entender cómo se toman las decisiones alrededor de estos escenarios de inversión, y generar recomendaciones para incluir el reuso como estrategia dentro de gestión del agua en la ciudad. El estudio muestra la sectorización y centralización del marco institucional, y los procesos de toma de decisiones correspondientes con una gran fragmentación y autonomía en la gestión. Esto se refleja en los procesos de planificación sobre inversiones en saneamiento. Se identificaron algunas causas raíces para ello: 1) no existen mecanismos de articulación entre diferentes ambientes de planificación (saneamiento, recursos hídricos, desarrollo urbano), 2) no existe una relación directa entre la empresa prestadora de servicio y las municipalidades, dado que responde directamente al nivel central; 3) procesos poco participativos en los diferentes ambientes de planificación, y 4) limitaciones en capacidades para seguir procesos participativos integrales. A pesar de estas limitaciones, se encontraron diferentes aperturas de una planificación integral, a diferentes niveles. A nivel central, existen varias iniciativas de buscar una institucionalidad más integral, a través de la creación del Ministerio de Ambiente y la revisión de la Ley de Aguas, y por la iniciativa de

formulación de lineamiento de política sobre tratamiento y reuso. A nivel local, también existen varias iniciativas municipales de tratamiento y reuso a nivel local. Aunque son actividades puntuales, vale la pena de promover y apoyarlos, para lograr innovación y promover un diálogo entre municipalidades, y entre las municipalidades y la empresa prestadora de servicios.

Full report at <http://www.switch.watsan.net/page/4304>

Appendix 4.8 Zaragossa

Urban Water Management: Water governance and institutional mapping in Zaragoza, Spain.

Maria de la Paz de San Miguel Brinquis

February 2009

This paper was requested as a contribution to the SWITCH workshop on water governance held in Delft in February 2009 where it was presented.

The paper documents the current water governance and institutional mapping of water in Zaragoza, as a starting point for future research activities. The current situation of the urban water governance in the city of Zaragoza, Spain, a SWITCH Demo city. Urban water management in Spain is described four main levels: European, national, regional and local.

The city of Zaragoza has a special characteristic in the management of the urban water cycle, because the municipality is the entity in charge of its management. While in most Spanish cities, the common situation is that the competence lies on the municipality, but the water supply and sanitation services are contracted out to private or public enterprises. The strengths and weaknesses of this unique situation in Zaragoza are presented in this document.

The main areas of focus in the analysis of governance are:-

Improving the quality of water supply and effectiveness of waste-water treatment,

Improving the economic efficiency of water and sanitation services,

Utilisation of alternative water resources, including rainwater and treated water,

Engaging citizens to empower them as part of the demand management strategy,

Influencing policies and developing strategies to facilitate the above activities to address the overall goal of integrated urban water management

Full report at <http://www.switch.watsan.net/page/3261>
