



# SWITCH in the city

putting urban water management to the test

Edited by John Butterworth, Peter McIntyre and Carmen da Silva Wells



# SWITCH in the city

putting urban water management to the test

Edited by John Butterworth, Peter McIntyre and Carmen da Silva Wells

IRC International Water and Sanitation Centre  
The Hague, The Netherlands

Butterworth, J., McIntyre, P. & da Silva Wells, C. 2011. SWITCH in the city: putting urban water management to the test. The Hague, The Netherlands, IRC International Water and Sanitation Centre.

Published on behalf of the SWITCH consortium  
by the IRC International Water and Sanitation Centre.

**Copy editor**  
Cheryl White

**Layout and Printing**  
Sandifort id • Katwijk, The Netherlands  
www.sandifortid.nl

**Cover photo credits**  
(clockwise from top left)  
Alejandro Rueda (Bogotá), Kwasi Attafuah (Accra),  
ERCE (Lodz), Johannes Gerstenberg (Hamburg),  
John Butterworth (Belo Horizonte), Cedare (Alexandria)

**To order more copies of this publication, please contact**  
IRC International Water and Sanitation Centre  
P.O. Box 8232 • 2508 EH The Hague, The Netherlands  
T +31 70 304 4000, F +31 70 304 4044 • publications@irc.nl

This publication is also available in pdf from the IRC website:  
[www.irc.nl](http://www.irc.nl)

ISBN: 9789066870789

Copyright © 2011 IRC International Water and Sanitation Centre

The content in this (product) is under a licence of Creative Commons specified as Attribution-Noncommercial-Share Alike 3.0.  
This licence allows others to remix, tweak, and build upon the (product) materials for non-commercial purposes, as long as they credit the copyright holder and license their new creations under the identical terms. <http://creativecommons.org/licenses/by-nc-sa/3.0/>  
The full legal text concerning the terms of use of this licence can be found at <http://creativecommons.org/licenses/by-nc-sa/3.0/legalcode>

# Table of contents

Preface	iv
<hr/>	
part 1	<b>Learning from SWITCH</b>
1.1	Introduction 2
1.2	What have we learned? 16
1.3	Perspectives on learning alliances as an innovative mechanism for change 38
<hr/>	
part 2	<b>City case studies</b>
2.1	The potential for treated wastewater use in Lima 68
2.2	Cali: city of seven rivers 84
2.3	Starting at the top: preventing pollution from tanneries and cleaning up the Río Bogotá 92
2.4	Water management and urban planning in Belo Horizonte 110
2.5	Learning together makes strategic planning possible for fast growing Accra 120
2.6	Integrated urban water management planning in Alexandria 138
2.7	Managing water risks in Birmingham: the city with the tastiest tap water in Britain 158
2.8	Zaragoza: taking pride in integrated water management 178
2.9	Hamburg: city with the largest river island in Europe 188
2.10	Lodz: city of water 202
2.11	Tel Aviv Water Club puts focus on wastewater treatment 214
2.12	Beijing: alternative water sources for peri-urban agriculture 224
<hr/>	
part 3	<b>Guidelines</b>
3.1	Starting a learning alliance 242
3.2	Stakeholder analysis 256
3.3	Developing a joint vision 272
3.4	Facilitating communication in learning alliances 280
3.5	Rapid urban water assessment 298
3.6	Scenario building 314
3.7	Strategy development 326
3.8	Innovating in learning alliances: action research concepts and practice 338
3.9	Promoting equity in processes 346
3.10	Process documentation 356
3.11	Monitoring success and less 368
3.12	Engaging with the realities of governance 378
3.13	Facilitating creative workshops 388
3.14	Transitioning urban water systems 396
<hr/>	
Contributors to the SWITCH in the city book	406

# Preface

*This book brings together findings from activities in 12 cities that each involved multiple consortium partners and many city stakeholders. The approach was specifically to encourage stakeholder engagement, and these chapters reflect the inputs of many city actors and researchers who contributed to the activities. These inputs are all gratefully acknowledged, as are the efforts of the authors.*

The guidelines presented in Part 3 of the book were originally developed to support a series of training workshops for SWITCH project staff that were facilitating learning alliances, and research partners. These workshops were held in Cairo, Lodz, and Ouro Preto along with several other tailored training sessions. The feedback received from participants at these events greatly helped to refine the guidelines. The workshops also benefitted from the participation of staff from other projects with relevant experiences and interests such as the EMPOWERS and RiPPLE action research projects. A series of city assessments in 2010, building on a similar exercise in 2008, was the basis for Part 2 of the book and the inputs of all the authors are acknowledged. Mike Morris, who was earlier instrumental in establishing the stakeholder engagement activities within SWITCH before switching his job, Jeroen Warner and Barbara Anton provided valuable advice at peer review workshops to discuss the findings of these assessments. The inputs of Alastair Sutherland in all these activities and his many perceptive insights are warmly acknowledged.

A conference 'Sustainable Water Management in Cities - Engaging stakeholders for effective change and action' in December 2010 in Zaragoza, Spain provided a further valuable forum to share and receive feedback on many of the ideas and findings presented here. A special thanks to the organizers of this event and especially to Josefina Maestu and her team at the UN-Water Decade Programme on Advocacy and Communication.

In addition, without the efforts of a fabulous supporting cast, production of this book would not have been possible. Angelica de Jesus coordinated the book production process with the assistance of Anjani Abella and Paz Blok, Cheryl White gave the text its final edit, Aminata Sylla coordinated all the finances and administration, Agnieszka-Urbaniak Butterworth drew the diagrams in the introduction and synthesis chapters, and Daniel Sandifort designed the book layout.

The SWITCH project was generously supported by the European Commission under the 6th Framework Programme and contributed to the thematic priority area of "Global Change and Ecosystems" [1.1.6.3] Contract no 018530-2. Partners also all made vital matching funding contributions. SWITCH was coordinated by the UNESCO-IHE Institute for Water Education under the management of Huub Gijzen, Kala Vairavamoorthy and Carol Howe and a management team that devoted many hours to debating the ideas and implications of learning alliances. The work presented here would also not have been possible without the warming to the approach of stakeholder engagement by the project's management team which over time allocated an increasing amount of funding to make the substantial city engagement that is presented in this book possible.

The editors would like to pay tribute to the enthusiasm and skills of the SWITCH learning alliance facilitators, and the researchers and other colleagues that found new ways to work during the project. These teams had the hard task of trying to put these guidelines into practice in each city, and to put down and share both their successes and failures.

*John Butterworth, Peter McIntyre and Carmen da Silva Wells*



part 1

# Learning from SWITCH



# 1.1

Water sensitive urban design at Trabrennbahn Farmsen in Hamburg. (Photo credit: Johannes Gerstenberg)

## Introduction

*With more than half the planet's population living in urban areas and rapid growth predicted, cities present a daunting test in water management. Their scale and concentrated populations provide a special challenge in providing water and sanitation services, creating a safe and pleasant environment and handling wastes. As sustainability concerns have moved up the agenda, the challenge is for cities to do more, with less: to provide better services to all citizens, with fewer negative and more positive environmental impacts on cities and their surrounding rural areas.*

The Sustainable Water Management Improves Tomorrows Cities Health, or SWITCH, project was a five year experiment focused on some of the key sustainability challenges in urban water management. In a number of cities around the globe, it set out to test what was needed for a transition to more sustainable urban water management through a combination of demand-led research, demonstration activities, multi-stakeholder learning and training, and capacity building. The rationale for this non-conventional mix of activities was that it would encourage research to be more relevant and facilitate better use of research findings in decision making. Winning the engagement of key stakeholders in each city was central to making the shift towards more sustainable and coordinated urban water management. This book focuses on that challenge.

The book brings together the experiences of 12 SWITCH cities across four continents – Lima, Cali, Bogota, Belo Horizonte, Accra, Alexandria, Birmingham, Zaragoza, Hamburg, Lodz, Tel Aviv, Beijing – with a set of guidelines focused on promoting stakeholder engagement that were developed to support the implementation of the project.

## The SWITCH project

The Sustainable Water Management Improves Tomorrows Cities Health (SWITCH) project was a major research partnership funded by the European Commission with a budget exceeding €20 million over the period 2006 to 2011. It involved an implementing consortium of 33 partners from 15 countries. SWITCH involved innovation in the area of sustainable urban water management often also referred to as integrated urban water management (IUWM). This ambitious project looked towards water management in the 'city of the future' and aimed to challenge existing patterns and to find and promote more sustainable alternatives to the conventional ways of managing urban water. SWITCH also set out to do things differently by carrying out action-orientated research in cities that was more demand-led, so that it reflected the expressed needs of cities. The project design included developing and encouraging learning alliances with the idea that they could help set the research agenda, and that their engagement would help put research across different aspects of the urban water cycle into use in cities, to help improve integration and scale-up impacts. By learning alliances, as explained in more detail below, we mean platforms that bring together stakeholders from a range of institutions – municipalities, service providers, universities, and in some cases NGOs and user groups – to think, act and learn together, using action research to test ideas. By scale-up we mean breaking out of the project mould and seeking to ensure that research that brings benefits finds its way into large scale use. In summary, the key concepts underpinning SWITCH were the need to examine alternatives, to put research into use, to seek integration across issues and solutions, and to think boldly about the city of the future (Figure 1.1.1).

Technical, governance and management alternatives were sought to challenge the established ways of managing the urban water cycle with its focus on centralisation, reliance on end-of-pipe treatment, and getting water and wastes quickly out of the city. A mixture of more decentralised approaches was explored, including 'closing the loop' by viewing wastes as valuable products and an opportunity for urban and peri-urban agriculture, and more natural approaches to drainage, stormwater management and the restoration of urban rivers based upon eco-hydrological principles.



Figure 1.1.1 Key ideas in the SWITCH project



Although large and well resourced by the general standards of water sector research projects, the project in each city was reasonably modest. Five years is also fairly generous for a research project, but in the terms of the history of these cities (consider the ages of Alexandria and Beijing for example) it is a very short time indeed. To have impact in a large city which has its own momentum of change, and ‘theory of immutability’ to protect itself against too rapid change, requires strong collaboration and pooled efforts by institutions and individuals. Even so, some impacts may only become apparent 10 or 20 years later.

### Stakeholder engagement in the SWITCH project

At the outset of the SWITCH project, the poor uptake of available research findings was a major constraint to having significant impacts in cities undertaking a research-focused initiative. Different perspectives are shown – researchers who were frustrated by the limited uptake of their work, with good ideas too often remaining on the shelf; and potential research users who were not satisfied with the way that innovations were sold to them by researchers. This was reflected at an early meeting with the Governor in Alexandria who said: “We need solutions, but we don’t want research”. SWITCH tried to bridge this gap between research providers and research users in the field of urban water management.

The challenge of doing this was reflected in the project design. This recognised that in most cities the institutional arrangements for the rather broad subject of water (including sanitation and many aspects of development and environmental management), are often fragmented with perhaps 15-20 organisations dealing with different aspects. It is normal to find relatively weak links and limited cooperation in practice between these organisations.

Urban water management was also viewed as a complex or ‘wicked’ problem (the WITCH in SWITCH) requiring integrated solutions. It was recognised that the problems are often so complex that they cannot be solved by individual stakeholders acting alone, that working on only a part of the jigsaw may be pointless or harmful as partial solutions may only create problems elsewhere. Also such problems are difficult to solve with technological approaches alone as socio-intensive approaches are also required.

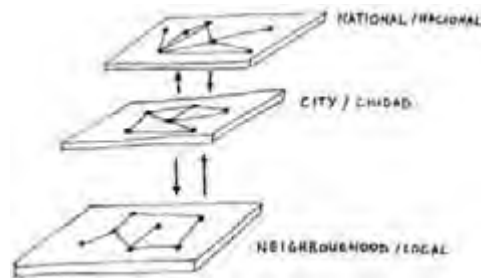
These three issues (limited uptake, fragmentation and complexity) were the basis for SWITCH seeking to develop a multi-stakeholder process approach in its research (Figure 1.1.2). An ambitious aspect of the project was to develop stakeholder platforms, called learning alliances, to ‘to guide and support the implementation of research and demonstration activities in the demonstration cities, taking into account local problems and needs, and leading to effective integration of activities at the city level and scaled-up implementation of findings within these cities.’ The learning alliances were a central idea in the original plan of the SWITCH programme. They represented a practical means of bringing key people and organisations (stakeholders) into the same forum to discuss problems that they had previously wrestled with in isolation. Their development has been a tortuous journey, with setbacks and successes. Over time, work on stakeholder engagement was allocated significant levels of resources, both human and financial, within the consortium and developed considerable momentum and a growing suite of activities. The learning alliances were the key mechanism for integration within the project, focusing on the city scale where integration of SWITCH activities was most vital and appropriate.

Figure 1.1.2 Three reasons for the focus on multi-stakeholder platforms (MSPs) in the SWITCH project



The stakeholder engagement model envisioned by SWITCH (Figure 1.1.3) was the development of learning alliances, nested and linked platforms at neighbourhood, city, national (for policy influencing) and global levels (for learning across cities). In practice the focus of most cities was at the city scale, with neighbourhood and national platforms only being developed in a couple of cases (Belo Horizonte at local level, and Lima at national level). A structured global learning alliance was never developed and this was identified as a significant weakness by several city alliances. However, ad-hoc interactions did take place at consortium level and SWITCH participated in many international conferences and events. Although these platforms were project and externally-driven, it was always the intention to build on and link to existing platforms where they existed. In Zaragoza, where multi-stakeholder platforms already existed at different levels (such as the city and autonomous region levels) no new ones were developed.

Figure 1.1.3 Learning alliance platforms at different levels



The learning alliances included start-up or design phase activities, operational activities and capacity building and backstopping activities. Start-up activities included recruitment of learning alliance facilitators; training; scoping studies and stakeholder analysis to identify key issues and priorities of stakeholders, and identifying the most relevant levels at which to work and building links to existing platforms. Learning alliances also held a start-up workshop or series of workshops to launch the project activities. A series of training activities was held during the first two years of the project and focused on process and event facilitation skills; communications; action research; visioning *etc.* The guidelines presented in part three of this book were originally developed to support those training courses. Operational activities of the learning alliances included workshops, competitions and World Water Day events to raise wider awareness; visioning and planning processes; experiments or demonstrations; field visits and a multitude of communications from websites and email groups to working the phone and visiting people in their offices. Support was provided from the global consortium team to the city teams on methodologies for stakeholder engagement, in particular support on monitoring and evaluation. This support was provided by the consortium partners that had a particular interest in stakeholder engagement processes, including the IRC International Water and Sanitation Centre (The Hague, Netherlands) and the Natural Resources Institute (Chatham, UK).

To support the monitoring and reporting undertaken by city teams, city assessments were led by a peer from another city or partner within the project consortium. This exercise was carried out twice: in 2008 at the mid-point of the project and in 2010 towards the end. In 2008, the focus was on helping to make the intervention logic in each of the cities more explicit, mapping the first outcomes of the project, and making recommendations for possible changes in the intervention logic and activities. In 2010, with the end of the project approaching, the assessment aimed to identify lessons learned on the effectiveness of the intervention logic, to look at whether the approach followed had provided the expected results, and to see what worked and what did not. The reports made recommendations for actions during the last months of the project to help achieve its goals (see Box 1.1.1), and identified mechanisms for scaling up and sustaining impact. The city chapters presented in this book are based upon these 2010 city assessment papers which can be found at: <http://www.irc.nl/page/62396>. These assessments reviewed documents such as plans and progress reports, but mainly used qualitative methods, seeking feedback from a range of stakeholders through interviews, questionnaires and correspondence, focus group discussions with learning alliance members and reflection meetings with the city team on the intervention logic and on the findings of the assessment.

#### Box 1.1.1 SWITCH objectives

The 2008 and 2010 city assessments were guided by the following general objectives of SWITCH:

- To improve the scientific basis for integrated urban water management within focus cities through fundamental research that fills key gaps across all aspects of the urban water cycle
- To test and demonstrate the feasibility and potential of innovative and better technologies (as set out in the SWITCH approach through demonstrations and other activities)
- To support cross-institutional platforms and better links between urban water stakeholders in a city, and between research providers and users (both to support an integrated approach to urban water management, and to maximise the uptake and impacts of innovative and demand-led science)
- To improve decision-support processes within focus cities (e.g. using more effective and accessible tools like City Water, SWITCH sustainability indicators) and the realisation of IUWM through evidence-based and far-sighted strategic plans and better policies.

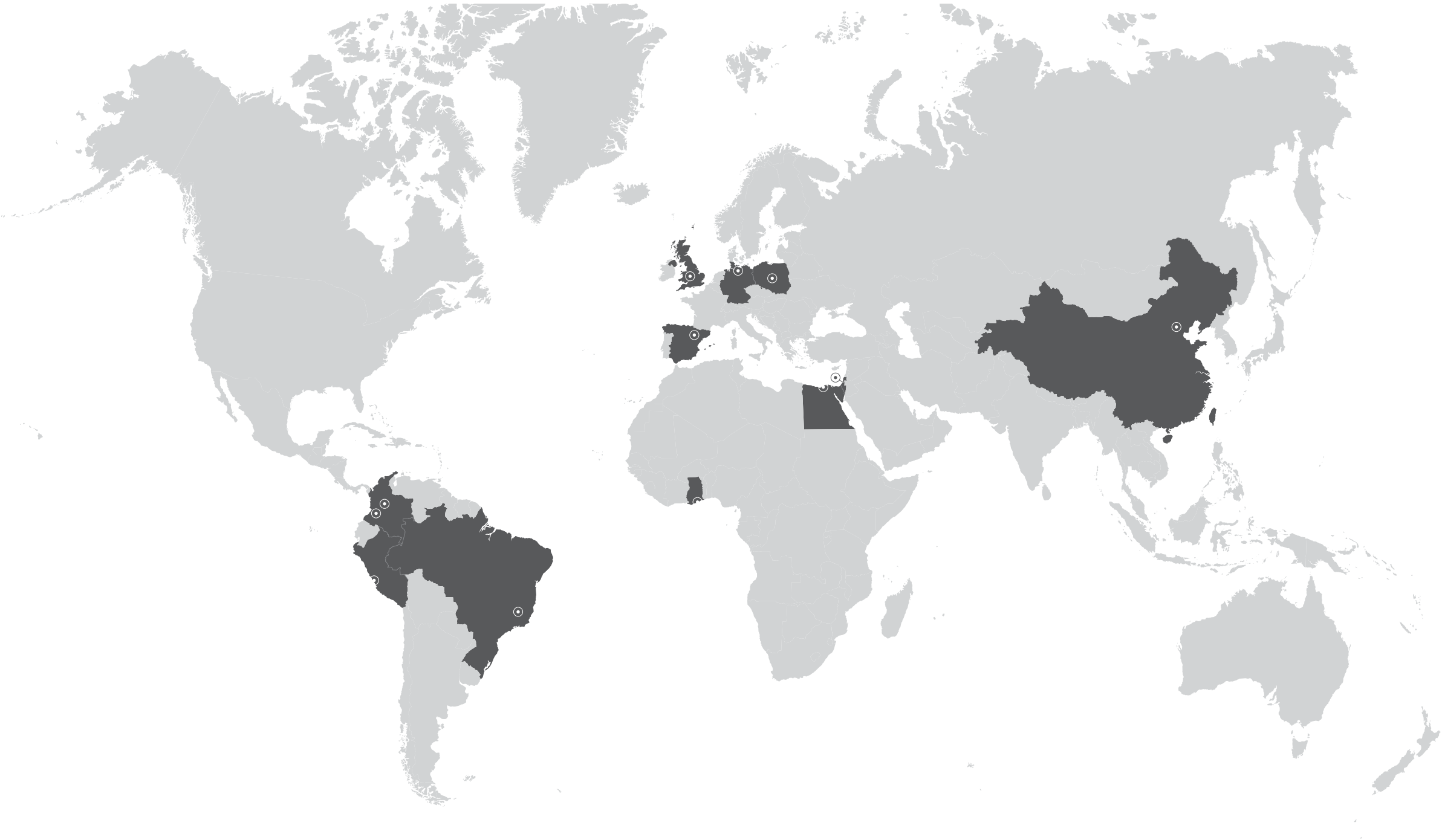
## SWITCH cities

During the proposal phase, a group of organisations coordinated by the consortium leader (UNESCO-IHE Institute for Water Education) contacted international partners to bring in their own expertise and help establish a series of 'demonstration cities'. This core of organisations became the consortium implementing the SWITCH project. In a much abused phrase, it was a 'coalition of the willing', led initially by a group of mainly Dutch and UK-based organisations that reached out to establish a project with a more global scope. Most partners were traditional scientific organisations, especially University departments, and the cities were locations where these organisations were based or already operating. Municipalities or other implementing organisations and service providers were involved as early as possible, although they became formal direct partners only in a minority of cities.

Although there were other case study sites, most SWITCH project activities focused on 12 cities spread across Europe; Latin America; Africa; the Middle East and Asia (see Figure 1.1.4). This covered a wide range of very different city contexts, although even these cities cannot be said to reflect every situation that will be faced by cities in the future. It is, however, important to highlight the sheer diversity of these 12 demonstration cities.



Figure 1.1.4 SWITCH cities



They included one mega-city, Beijing, (a population of more than 10 million), nine cities with a population of more than two million, and two smaller cities with populations of more than half a million people. Six of the cities have a moderately increasing population (Accra, Cali, Alexandria, Belo Horizonte, Bogotá and Lima) and one city has recently experienced a slight population decline (Lodz) (Figure 1.1.5). None of the cities were growing rapidly (more than 4% per year) and the list includes no small or medium sized cities in developing countries where most urbanisation is taking place. Lodz and Zaragoza in Europe were the only smaller cities. The cities included five capitals, which by their very nature, tend to be richer and have stronger institutional frameworks. As they usually include the centres of state power, capital cities can be expected to have more influence on national policies. Many of the other cities were the second or third cities in their respective countries.

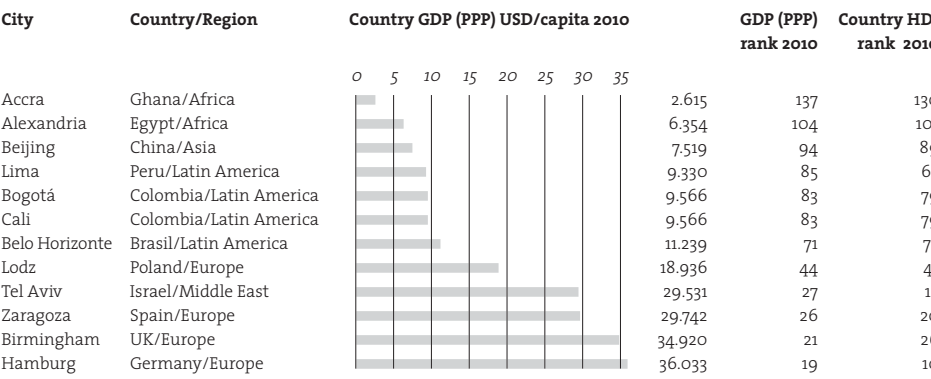
Figure 1.1.5 Populations of the SWITCH cities



Note: Data presented here are for urban agglomerations from the 2009 Revision of World Urbanization Prospects available at <http://esa.un.org/unpd/wup/index.htm>. Being drawn from a global database and given different ways of defining urban boundaries as well as data sources, they may differ from local data presented in the city chapters.

Most of the cities are located in middle income to richer countries (Figure 1.1.6): five in high income countries in Europe and the Middle East (Israel); four in upper middle-income (Brazil; Columbia (2); Peru); two in lower middle income countries (Egypt and China); and one in a lower income country (Ghana). Of course, national statistics only tell part of the story. Accra is at the same time, the poorest city within SWITCH and the richest city in Ghana. There are also high levels of inequality within cities, particularly in the Latin American cities and in Tel Aviv, Israel.

Figure 1.1.6 Economic settings of the SWITCH cities



Note: Data for 2010 from the International Monetary Fund’s World Economic Outlook Database available at [www.imf.org](http://www.imf.org) and <http://hdr.undp.org/en/>

Some SWITCH cities are in very dry environments. At the most extreme, Lima is located in a desert where rainfall averages only 13 mm per year. Two cities at opposite extremes of the Mediterranean: Alexandria and Zaragoza (actually a couple of hours inland), are also rather dry. Tel Aviv and Beijing experience less than 600 mm rainfall per year and both have very large water demands leading to very real situations of water scarcity. Coastal cities include Accra, Alexandria, Tel Aviv and Hamburg on the tidal River Elbe, with low-lying Alexandria being the most vulnerable to sea level rise owing to its location in the Nile delta. Other cities such as Belo Horizonte, Birmingham and Cali have too much water at times and are prone to floods. In Birmingham, rising groundwater levels are causing concern as extraction rates drop with the decline in manufacturing. These and other key priority water issues that were identified in the cities are summarised in Table 1.1.1.

Table 1.1.1 Priority water issues identified in SWITCH cities

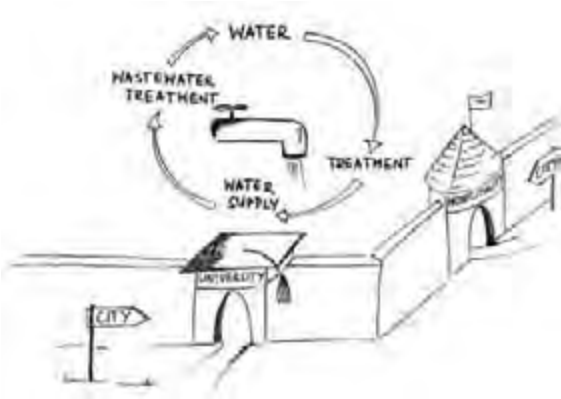
City	Average annual rainfall (mm)	Priority water issues
Lima	13	Impacts of climate change on Andean water sources; low levels of wastewater treatment; water supply for greening and productive activities in a context of extreme scarcity and risks of using untreated wastewater
Alexandria	178	Managing water supply (from Nile) and demands; extending sewerage in low income areas; expanding sewage treatment capacity; and managing industrial discharges to reduce pollution of Lake Maryout; flooding risks linked to sea level rise
Zaragoza	318	Water demand management; using water to improve the urban environment
Tel Aviv	531	Managing water supply and demands in context of scarcity; expanding desalination, recycling and reuse of wastewater
Beijing	572	Water scarcity due to high and growing demands
Lodz	599	Restoration of polluted and buried rivers as part of revitalisation efforts; disposal of contaminated sludge from wastewater treatment; flash flooding
Birmingham	662	'Future' risks: climate change; rising groundwater levels; flooding
Accra	725	Access to water and sanitation services especially in low-income neighbourhoods
Hamburg	773	Redevelopment of waterfront locations (especially Wilhelmsburg island); flood protection
Bogotá	824	Industrial and wastewater pollution of the Rio Bogotá and impacts on the environment and city water supply
Cali	908	River pollution: an integrator of different problems upstream and its impacts (including high water treatment costs)
Belo Horizonte	1491	Flood prevention; collection and treatment of wastewater; extending sewerage in remaining unserved low-income areas and reducing downstream impact of the city through pollution

Sources: Rainfall data from WMO and (for Lodz) from [www.stat.gov.pl/cps/rde/xbcr/lodz/ASSETS\\_o6mo1\\_o5.pdf](http://www.stat.gov.pl/cps/rde/xbcr/lodz/ASSETS_o6mo1_o5.pdf)

While the SWITCH project had a consistent overall approach, the interventions in each city sought to link activities to desired outcomes according to local contexts and interests. The SWITCH approach at city level was therefore different in every case. Some cities focused on the whole city and started from a more holistic or institutional perspective to urban water management, while other cities decided to focus on one key part of the urban water cycle, such as wastewater reuse or urban agriculture. With the exception of water and sanitation in Accra

and sanitation in Alexandria, access to basic services was not the main focus. More commonly, the area of interest was the environmental side of water management such as sustainable urban drainage (SUDS), ecohydrology and river restoration, and wastewater reuse. The choices made by SWITCH were linked to where cities were in their development process (Jefferies & Duffy, 2011) but also the interests of the consortium partners and their existing contacts in the city. The entry to the city by the SWITCH project was often through a technically-focused department in a University (Figure 1.1.7), sometimes with the municipality also as the key initial partner. Part 1.2, outlines how these entry points were critical to the way that stakeholder engagement was addressed by the project.

Figure 1.1.7 The way SWITCH entered cities was critical to how activities were subsequently developed, especially the focus of stakeholder engagement



In this book, you will read about some of the concerns that planners, water sector specialists and researchers have for the future, but you will read rather more about their hopes. Each city learning alliance developed a vision for the future and those visions were generally optimistic rather than apocalyptic. If it is possible to draw out a consensus from this diversity of people and specialisms, it is that modern cities can be made to work, that stormwater and sanitation issues can be tackled and that water can be a leading asset in creating cities of the future where people want to live. The Lodz city vision of a 'blue-green network' echoes the hopes of many throughout these cities. To achieve those hopes requires that the alliances made during SWITCH do not disappear but are strengthened, and that new alliances are made so that the problems identified and addressed during SWITCH are effectively tackled in the longer term.

# Structure of this book

In Part 1, two summarising contributions reflect on the project outcomes and lessons learned at the SWITCH consortium level (based upon interviews with stakeholders in the research), and at the city level, teasing out lessons that might be transferable to different contexts. Part 2 tells the stories of 12 very different but fascinating cities. It describes the mix of research, demonstration and training activities, with many specific outcomes and continuing hopes for the future. It tells how in most of these cities, learning alliances brought together stakeholders to build new relationships for action research and it explores the challenges this brought for facilitation, communication and documentation. Part 3 of the book provides a set of ‘how to’ guidelines targeted at enabling stakeholders to engage constructively in the design of innovation and intervention processes and to promote putting research into use. Each of these guidelines is supported by key lessons and examples from SWITCH cities, including tips and tricks, and sources of further information.

**Acronyms used in this chapter**

IUWM	Integrated urban water management
SUDS	Sustainable urban drainage systems
SWITCH	Sustainable Water Management Improves Tomorrows Cities Health
UNESCO-IHE	Institute for Water Education, Delft, The Netherlands
WMO	World Meteorological Organization

**Reference**

Jefferies, C. & Duffy, A., 2011. *The SWITCH Transition Manual*. [Online] Available at: [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/W1-3\\_GEN\\_MAN\\_D1.3.4\\_SWITCH\\_Transition\\_Manual.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/W1-3_GEN_MAN_D1.3.4_SWITCH_Transition_Manual.pdf) [Accessed 1 June 2011].



# 1.2

Transplanting along a restored length of the Sokolowka River. (Photo credit: ERCE)

## What have we learned?

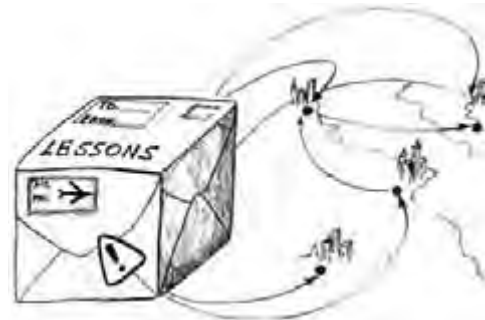
### Identifying transferable lessons from SWITCH city experiences

John Butterworth, Jeroen Warner and Peter McIntyre

## Five years in the life of a city

In the introduction to this book it was stated that five years – the length of the SWITCH project – is not a long time in the life of a city. Yet it is in the cities, rather than globally, that the impact of SWITCH is felt. It is here where institutions have their headquarters, policy is made, research is conducted and ideas compete most vigorously. Cities are centres of business (busy-ness) and rapid activity and they attract people who want to make change and get things done. SWITCH steps into this bustling arena with its ambitious agenda and its talk of ‘paradigm change’ and grabs the attention of those involved in water policy and practice and encourages them to sit down and talk to each other and to researchers, and to map out a plan for integrated urban water management (IUWM). SWITCH research will be demand-led and connected closely to action. Maybe in this shape-shifting, hyperactive brave new world, these policymakers and researchers don’t even sit down around a table. Maybe they interact strap-hanging on the metro or in virtual meetings via their smartphones, or over a fast food snack at the mall. Whatever and however, stakeholders (that catch-all for anyone you want to include) will “learn together and learn to work together”. And when the five years are over, SWITCH will have made a step towards “managing water for the city of the future” so they can overcome their “ever-increasing difficulties in efficiently managing scarcer and less reliable water resources”. Well, that’s what it says on the tin, or rather, the SWITCH website. So did it? Did SWITCH make a difference where it counts, in the cities of 12 countries around the world, and influence the development of city water resources and therefore the urban environment? Or will the influence of SWITCH related research, discussions and activities soon vanish from the collective city memory?

We might as well hint at the ending of this chapter now. On the one hand, it really is too early to tell. But on the other hand, we can already draw some general conclusions based on observed outcomes. For one thing, the narrative will be different in each city partly because SWITCH functioned in different ways and with different agendas, but mainly because context is everything. The city is a giant with its own history, current practice and way of thinking. It has momentum, and that means that it changes slowly and only when multiple factors pull in the same direction. SWITCH, even at its most energetic and enthusiastic and committed, is a small buzz in a large world, one that can easily be drowned out by the traffic. Another reason for ticking the box marked ‘don’t know yet’ is that the changes SWITCH was interested in take place over a long period. If there is a new culture of collaboration between planners and researchers that will show in the long term, in the form of more practical research that is better applied. If urban water management becomes more integrated and adaptive, that should result in a better quality of life maybe ten years after the end of the project. Every SWITCH city enthusiastically devised future scenarios and visions that expressed their hopes and fears. These recognised that the pace of change is not measured in a few months. Indeed many of the visions were for 2020, 2030 or even later.

**Figure 1.2.1 Which lessons can be transferred between cities?**

But it is still fair to ask the question: did SWITCH work? Was it good practice? Should it be repeated or reinvented? This chapter makes an attempt to identify the lessons that might be, or are most likely to be, transferable and of the most value to others (Figure 1.2.1). Part 2 of this book presents the activities of the SWITCH project in 12 very different cities, with an emphasis on how stakeholder engagement was developed through the learning alliances that the project established, and the demonstration projects that sought to bridge the gap between researchers and practitioners. This chapter brings together the lessons learned relating to stakeholder engagement, and its interface with other project activities, concentrating on the experiences and achievements of the cities. Chapter 1.3 examines SWITCH experiences from the different perspective of the multi-partner research consortium and asks whether 'learning alliances' (the SWITCH preferred model) are really mechanisms for change. It is recognised that the cities and contexts covered are very different, but an attempt is made here to identify the lessons that might be, or are most likely to be, transferable and of the most value to others. The term 'best practice' is avoided since practices transferred from one context to another are unlikely to be 'best' in both cases (Duignan, 2009). A practice is only 'best' in a particular context and even if the parts of the SWITCH experiment that worked best were repeated in the same cities a few years later, or with some different stakeholders and new entry points, the same approach probably still would not be the best.

The individual city chapters that follow in Part 2 of this book reveal the very different contexts. However, they also show that SWITCH teams in the cities often ran up against similar problems, and sometimes found similar solutions. Context may be critical for success or failure, but it turns out that doing the right things right is also a major factor for success. And there have been successes. Everyday activities continue after the end of SWITCH that owe thanks to the project, from better urban farms in Beijing greenhouses to cleaner leather production in Bogotá and from the strategic planning platform in Accra to the sectionalisation of water supply in Zaragoza.

This chapter will start with a quick summary of 12 city cases, and will then examine SWITCH's overall approach with respect to stakeholder engagement, assessing how well it has addressed the four key SWITCH objectives that were also presented in the introduction:

1. To improve the scientific basis for integrated urban water management within focus cities through fundamental research that fills key gaps across all aspects of the urban water cycle.

2. To test and demonstrate the feasibility and potential of innovative and better technologies (as set out in the SWITCH approach through demonstrations and other activities).
3. To support cross-institutional platforms and better links between urban water stakeholders in a city, and between research providers and users (both to support an integrated approach to urban water management, and to maximise the uptake and impacts of innovative and demand-led science).
4. To improve decision-support processes within focus cities (e.g. using more effective and accessible tools like City Water, SWITCH sustainability indicators) and the realisation of IUWM through evidence-based and far-sighted strategic plans and better policies.

This is what SWITCH set out to do. Lessons learned in each of these areas provide insights into how we and others could be more effective in the implementation of programmes with similar objectives or characteristics. These lessons were partly identified through a peer review workshop held in Lodz in May 2010 to discuss the findings as assessed in each city, and also draw heavily upon the series of city assessment papers<sup>1</sup>.

## Summary of city priorities and outcomes

- In Lima (Figure 1.2.2), the focus that was selected was to scale up the reuse of wastewater in green productive areas in an extremely water scarce environment that receives only 13mm rainfall each year (Table 1.1.1). The project developed learning alliances at national level focusing on policy issues and at local level linked to a demonstration project and related research. The main policy outcome was the development and official approval by government of national policy guidelines that promote safe reuse of wastewater in the country. An eco-productive park on a former desert area became a valuable resource and play area for a local community, but was prevented from (re)using treated wastewater for growing food by restrictive legislation.

**Figure 1.2.2. Lima**

<sup>1</sup>The city assessment papers were used to produce the summary chapters published in this volume. Full city papers are available at [www.irc.nl/page/62396](http://www.irc.nl/page/62396)

- In Cali, the project focused on research, creating dialogue and promoting sustainable alternatives in relation to pollution of the Cauca river, urban drainage and city expansion. Creating a shared vision proved essential to counterbalance prevailing short term planning and construction. Outcomes were used in SWITCH planning processes, which in turn fed into formal planning processes and public policy advocacy. SWITCH in Cali was said to have adopted a method of 'strategic opportunism' to bring ideas into the mainstream, with success. Some alliance members have become ambassadors in their own organisations for SWITCH ideas. Outcomes beyond the research reports and training were a reduction in the emphasis on end-of-pipe solutions in wastewater management and growing consideration of alternative technologies in new housing developments. Planning processes at municipal level and national policy consultations on the future of the Cauca river are building on SWITCH dialogue, outputs and advice.
- The Río Bogotá (Bogotá River) is highly polluted, and the project focused on preventing pollution by small-scale and informal sector tanneries on the upper part of the river. Key players that engaged throughout the project were an association of the tanners, the environmental regulator, local government, an NGO, a university and the Chamber of Commerce. Almost half of the polluting, informal small enterprises have now implemented cleaner production principles thereby removing much of their pollution. This has also led to an increase in their productivity. SWITCH supported a process of conflict resolution, capacity building and dialogue, and the regulator is now pursuing these alternatives to a punitive, legalistic and failing approach. The research supported the tanners in making changes and a follow-up project is now expanding this approach across a wider catchment area.
- In Belo Horizonte, more natural and less environmentally damaging approaches to urban drainage to minimise flooding risks while improving river corridor habitats. A partnership between the municipality and the University was at the heart of the project while learning alliances at the local/community level engaged schools and communities around several demonstration projects, and planning and service institutions at the city scale and beyond. The Municipal Parks Foundation is now committed to scaling up rainwater harvesting while participatory budgeting committees have started to implement alternative and more sustainable solutions as a result of the training and exposure SWITCH provided.
- In Accra, SWITCH played a critical role in providing information for municipalities across the city and bringing these municipalities together. SWITCH helped the debates to move from 'fluffy ideas' to more realistic strategic planning. The research that had the biggest impact was the collection, compilation and analysis of secondary data on different elements of the urban water cycle, using a framework (RIDA) that will continue to be used by a 'strategic planning alliance', which is how the learning alliance is expected to develop. Findings are now being utilised in the development of a new World Bank supported project and for the Metropolitan Assemblies' development plan. Demonstrations focused on urban agriculture working with urban farmers to show wastewater irrigation can be made safer, and how urine can be collected and reused.
- Alexandria, the most downstream city along the longest river in the world, focused on the development of an integrated urban water management plan and the demonstration of how urban slum communities could be served with water supplies.

The learning alliance conducted nine studies that focused on determining current and future water production as well as an assessment of strategies to decrease unaccounted water. It succeeded in attracting and keeping the attention of all the key actors in city government, water and sanitation utilities, an urban slum community and a research focused institute. The studies were expected to inform the city's IUWM and the water company's master plan. The project ended in Alexandria on something of a cliff-hanger. Would the massive gains made during SWITCH be institutionalised for the future or would they fall away?

- Birmingham concentrated on future risks such as how climate change may impact on flooding and the implications of rising groundwater levels as industrial consumption falls. Partners included the city council, the water company, the Environment Agency, the regulatory authority, consumer bodies and a professional association. Birmingham conducted research on the ability of green roofs to reduce the risk of flooding and has attracted interest from planners who want to know if this could be a win-win planning condition for developers. One outcome of engagement with development agencies was that SWITCH influenced the redevelopment plans for a major site within the city centre, reducing costs and introducing more sustainable alternatives.
- In Zaragoza, the project focused on demonstrating 'sectionalisation' as a means to manage water demands in a city that takes pride in minimising its water consumption. Sectionalisation has now been scaled up or is under study across almost half the urban area, and included in draft municipal by-laws. The project used existing multi-stakeholder platforms (Warner, 2007) to communicate these activities especially the Municipal Water Commission. Expo Zaragoza in 2008, which focused on sustainable water management, was an important venue for showcasing these activities.
- In Hamburg, SWITCH focused on improving planning on the river island of Wilhelmsburg. Learning alliance activities brought together a broad range of stakeholders from the island in the development of a water management plan that raised the level of discussion on the island's future development. Unfortunately it proved impossible to realise intended demonstration activities. Ironically perhaps, Hamburg was the city with the most sophisticated thinking about urban water, but came closest to an early closure of the project. It was rescued by a new team and in particular by appointing a full time facilitator. There was criticism that the initial approach had been too theoretical.
- In Lodz, the focus was on restoring rivers that had become polluted, degraded and even buried, as the city developed a 'blue-green network' vision that linked a network of river systems with green areas as a basis for planning and economic development. A successful demonstration project has partially revitalised one river corridor providing a more attractive environment for residents and future development. Further activities will be firmly embedded via the learning alliance in the city institutions that are responsible for continuing and scaling up river restoration across the city. The idea of linking restored river corridors and other open green spaces is now recognised as part of the city's planning strategy.



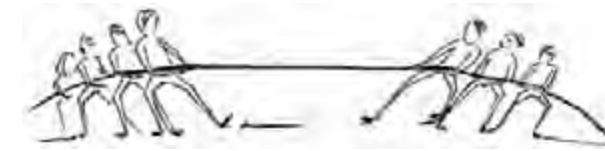
- In Tel Aviv, research focused on developing soil aquifer treatment technologies to facilitate the reuse of wastewater, which is going to become ever more important in the region for agriculture and for green spaces. There is an important research agenda on whether, and how far, micro-pollutants pose a risk in treated wastewater. A significant outcome through engagement with the city planning authorities was the inclusion of water issues in the strategic plan for the city, where they had been completely overlooked.
- In Beijing, the project focused on how urban farmers may cope with the pressures put on them by the city in response to increasing water scarcity as urban water consumption grows. Learning alliance meetings brought together research institutes, government officials and farmer cooperatives. Methods of working had to be adapted in a country where policy is very much evidence based and planning is a complicated process of bottom up influence and top down implementation. A demonstration project showed how roofwater harvesting can provide a useful source of water for urban farmers and support a shift to higher value crops and to agro-tourism.

## Transferable lessons: Overall project approach

### SWITCH and stakeholder engagement

The diverse realities of SWITCH city learning alliances are analysed in some detail in the next chapter, but it's important to note that the stakeholder engagement aspects of the project were controversial and contested within the project consortium (Figure 1.2.3). The approach proposed was new for most of the consortium members and its implications were uncertain. Everyone supported the concept of platforms for considering and learning from research and for relating demonstration projects and research to the key needs of the city. However, in practice there was a strand of opinion that project money should not be spent on this. In consequence, while learning alliances were a central component of the original work plan, learning alliances at city level were not funded fully at the outset. There was an initial assumption within project management that SWITCH research would itself leverage stakeholder engagement and that others (i.e. local stakeholders) would step in and fund the necessary learning alliance activities. Although local stakeholders did commit significant in-kind resources over time, this proved a rather optimistic point of departure for the project. At an early stage it became clear that the project would have to directly fund learning alliance related core costs such as the facilitators. Throughout the project, more and more resources were allocated to stakeholder engagement and it gained a higher profile during the project as the nature of the activities and their relevance and benefits became clearer. Ultimately, the learning alliances became the main mechanism to integrate aspects of the project. Through the alliances findings from different areas of the urban water cycle were brought together in various ways and joint responses such as strategic plans developed.

Figure 1.2.3 The idea of what learning alliances should be was strongly contested during SWITCH



It is worth reflecting on why stakeholder engagement was contested within the project. Within the consortium there were widely varying organisational and professional cultures, and many different disciplines as well as obvious differences in country culture. Within consortium organisations there were markedly different incentives for the people employed and tasked to the project. On the one hand there were 'classical', detached, analytical researchers and on the other hand, individuals who wanted to implement ideas, be activists for change and engage decision-makers directly. Some wanted to study and observe, and others were eager to make things happen and promote change. There was also a more subtle tension between sticking to a planned mode of project implementation with a detailed set of activities for the full duration, and a process that focused on agreed outcomes but adopted a flexible and adaptable set of activities to achieve this. The project had to do serious 'boundary work' (Gieryn, 1983) to try and bridge these gaps between interests, disciplines, views, incentives, and rules and it was partly successful in this respect, which means that it was also partly not successful. The next chapter discusses these aspects in more detail.

The bottom line is that there is a real risk of stakeholder engagement being included in a plan to attract the funding that goes with it, without necessarily getting the attention, resources or management commitment needed for it to be successful.

The amount of investment made in learning alliances at the city level by the project was typically about €25,000 per city per year once the costs of physical demonstration activities were excluded. This was used mainly to fund the facilitator and the organisation of meetings and other events, communications and the production of publications. Initially the project took a decision not to budget for these costs since it did not want to create platforms that could not be sustained after the end of the project. In the end, the project had to fund such costs if it wanted the activity to happen, and especially if stakeholder engagement was to happen in any kind of timely and integrated way with the research activities that it was intended to support. The sustainability issue is real but probably misplaced. The same argument could be made of anything a project funds, whether research or stakeholder engagement. A more important question is how to show the benefits and impacts of stakeholder engagement. It is necessary to make the case for stakeholder engagement: everyone likes the idea of integration (coordination) but rarely do people want to pay for it.

Stakeholder engagement should have a purpose of course, and can become devalued if it is only seen as something to do rather than a means to an end. In SWITCH there was a very specific intention and this was facilitating the process of putting research into use. The purpose of learning alliances may change over time, and the platforms need not go on and on. In that sense the concerns about sustainability of platforms, used as a main argument to deny initial funding, were also probably misplaced. The consortium partners no longer have the big research

budget which over the five years of the project enabled them to put their resources at the disposal of cities. For this, if for no other reason, the stakeholder engagement processes in the cities where they are sustained, will look quite different in the future.

### Integrated urban water management: towards IUWM-lite?

In SWITCH, taking steps towards Integrated Urban Water Management was a key goal. IUWM is an urban version of Integrated Water Resources Management (IWRM), a concept popular around the turn of the century seeking to integrate the water cycle and make water management more participatory, accountable and socially, environmentally and economically sustainable. In fact, the to-do list associated with IWRM is so extensive and daunting that examples that tick all the IWRM boxes are extremely rare. Butterworth *et al.* (2010) have suggested that partial IWRM (IWRM-lite) is better than no IWRM. That is, if we see a tendency for sectoral water managers to integrate their actions to some degree and involve the general public and stakeholders (which also raises awareness in citizens), we should applaud that rather than highlight the shortcomings against the ideal. This might encourage cities that follow the spirit (the principle), if not the letter of IUWM, to continue along their path. Following underlying principles of IWRM means pursuing equity, efficiency and sustainability in providing (better) services to urban dwellers. Seen against this light, many SWITCH cities are not doing so badly. For example, treating wastewater (for crop irrigation) and stormwater as a resource (e.g. in green roofs) integrates sectors and services that have often been segregated.

Moriarty *et al.* (2004) have suggested a twin-track approach based on local government engagement in (a) catchment level institutions together with other local/regional authorities (macro level), and (b) the implementation of local level IWRM, where local government supports joined-up actions. This could be combined with the implementation of local level IWRM, where local government supports joined-up actions (micro level). Cities that have nested learning alliances such as Lima and Belo Horizonte seem to hold the promise of achieving these twin tracks. Engaging with larger structures, such as regional or national planning processes, or advisory bodies, has been enormously helpful in embedding SWITCH research and outputs. The skills of SWITCH Birmingham, for example, are sought by both public sector bodies and private consultants.

### Adaptive urban water management

The concept of IWRM is increasingly being challenged by the notion of adaptive or sustainable water management. Adaptive management takes its cue from complexity studies, and critiques the linear thinking underlying much contemporary water management. Urban water management is a “complex and fragmented area relying on traditional, technical, linear management approaches” (Brown and Farrelly, 2009) where owing to institutional rigidity there is a consistent failure to go beyond ad-hoc demonstration projects. Some suggested remedies are to foster social capital, inter-sectoral professional development, and inter-organisational coordination.

The concept of adaptivity implies that change and uncertainty makes complex systems impossible to steer – the best we can do is judiciously influence reaction to positive and negative processes leading to change. Since cities are often in great flux, adapting to changes, whether demographic, economic, political or environmental, requires highly flexible planning and management. However, legislative and administrative structures are often ‘top down’ and too

rigid to benefit from adaptive management. In Beijing it seems possible to get caught between a fairly rigid national structure where higher officials want evidence rather than discussion, and local government which may lack the patience to work through multi-stakeholder processes and prefer quick decisions based on learning by doing. This could be seen as being adaptive without being reflective.

Owing to the structural uncertainty about interrelations, we have to “act without knowing enough” (Lee, 1999). A learning approach is therefore part and parcel of an adaptive management approach, where assumptions, policies and practices are constantly re-thought and reformulated in light of changing circumstances. That means the problem definition is not stable. In short, “adaptive management is learning to manage by managing to learn” (NeWater, 2005). For this, constant monitoring is important, as reflected in the more successful learning alliance designs in SWITCH cities, which emphasise the significance of process documentation and reflection sessions.

### Transferable lessons:

## The SWITCH project intervention logic in cities

The SWITCH project came with its own intervention logic: partly explicit in the original project design documents (Figure 1.2.4) and partly implicit but no less important, where consortium partners had their own ways of working and their own interests. This enabled some unexpected flowers to blossom, but also risked stifling more fragile species.

Figure 1.2.4 The plans of SWITCH were set out in a 5 year ‘description of works’



### Levels of engagement

The intention was that stakeholder engagement, in order to promote the scaling up of innovations in urban water management, would need to span national, regional, city level and

local (i.e. neighbourhood) stakeholders amongst others. In practice, most cities focused on the city level in their learning alliances. One important lesson learned was the need to intervene at the right scale, and this is not the same in different cities. We saw varying degrees of influence at national, regional, city and local stakeholder levels and the city scale was not always the best scale or entry point for a research and learning initiative. For example, in Birmingham with its regionally focused private water company and strongly centralised government context, the institutions at the city level have much weaker powers in urban water management. In the city of Lodz, on the other hand, the most important institutions can be more easily coordinated at the city level. Lima and Belo Horizonte illustrated the use of platforms at multiple levels successfully. For example, in Lima a learning alliance platform at local (sub-city) level was focused on a demonstration project to pilot the reuse of wastewater and lessons learned were fed into a national level platform that brought together different institutions and people with a focus on achieving improvements in national level policy. While engaging at multiple levels and linking learning platforms together might have been productive in other cities as well, limited resources made this difficult and pragmatic choices were generally made to focus on the city level.

### Project and partner history

At the outset of the project, city level partners were selected for their profile in urban water management, rather than on the basis of their experience, competencies or interests in stakeholder engagement. We have learned that project and partner history ultimately has a strong impact on the nature of the stakeholder engagement process. In most cities, a University was the lead partner, usually represented by a more technically focused or engineering department. There are few organisations such as the Cinara Institute at the University of del Valle in Cali with a long history of action research in water management issues. To deliver on learning alliances, most had to develop new competencies, recruit staff as facilitators or establish new partnerships. Some cities were able to do this more successfully than others with responses ranging from the recruitment of full-time professionals with networking, communications and stakeholder engagement experience, to the appointment of junior graduates who were enthusiastic but had little previous experience or support within their organisations. Often this was one more task on top of an already full workload. The limited seniority of learning alliance facilitators in many cases contributed to their relative weakness in terms of being able to influence the research agenda. Researchers generally remained firmly in charge. Often the city coordinator ultimately directed the learning alliance facilitator and employed that person on a short-term contract, and was also the project leader at the main research organisation involved in the project. This could have led to conflicts of interest if within the learning alliances money was being spent in other ways than the research provider intended.

Faster progress tended to be made where partners could adapt within more flexible institutions and had access to higher levels of facilitation, communication and social science skills. Regular participation in training events to build capacities also proved its worth as the project unfolded. There was also an advantage in having the municipality (with a sizeable budget) as a formal partner since this brought more convening power with the potential to influence official policy and practice. This was certainly the case in Belo Horizonte and Lodz.

In conclusion, the way you start such a stakeholder process, and who with, is critical to the rate of progress and outcomes. The need to invest a lot of time in getting these things right in the pre-project and inception phases was a lesson only learned with the benefit of hindsight.

### A role for outsiders

In several cities the positive role of international collaboration in bringing new perspectives and supporting learning was highlighted. Perhaps this is not all that surprising for a multi-country project where the partners had presumably signed up to exploit the network and the access to knowledge it provided. Nevertheless, city alliance members appreciated the opportunity that the project created to reflect on experiences from other cities. SWITCH emphasised looking at new ways of doing things rather than only looking for new things (i.e. new technologies) and this lent itself to sharing experiences and approaches. Within these processes there were also occasions when the genuine interest and enthusiasm of outsiders stimulated locals to be proud of their own experiments and achievements, and helped them make other people listen and to help make the case for change. Language issues and travel costs however inevitably got in the way of drawing real benefits from exchange, and in several cases, expectations of learning between cities were not fully realised.

## Transferable lessons: Building the scientific base

### Demand-led research

The project aimed to undertake demand-led research as this can drive stakeholder engagement. This is because it is empowering and generates interest when cities can gain access to the new knowledge that they believe they need (Figure 1.2.5). A large amount of effort at city level was to carry out fundamental research to fill knowledge gaps across aspects of the urban water cycle, as well as collating and synthesising existing information as an input into strategic planning processes. But the idea of demand-led research is a problematic concept and SWITCH cannot claim to have achieved it. Research projects were identified in the project formulation phase, before platforms that could discern local demand could get up and running. By the time they did, research packages were often *faits accomplis* and PhD students had begun work. Researchers often operate within environments (including projects) that make it very difficult to respond to demand. Moreover their own research interests seem to them to represent demand! It is easy for researchers to justify why what they want to do is the right thing to do. There is always a risk of finding a 'solution in search of a problem' (Cohen *et al.*, 1972).

Figure 1.2.5 Engaging new actors in science was part of SWITCH



Responding to demand for research depended on the ability of the city teams (both individuals and their institutions) to acknowledge a change of direction and negotiate changes with various managers. This was undoubtedly much harder than just following the plans that had been set out at the start of the project. Moving budgets between activities and partners means that some people and organisations lost out. Regrettably, city-specific concerns could not always be accommodated in the project. A city may be slated for a water quality project while citizens feel flooding is the issue. Commendably, however, during the project many of the consortium partners proved increasingly willing to modify activities in line with the needs of the cities as they became clearer and better voiced during the course of the project. For example, several partners supported the city of Lodz's demand to respond to stormwater management, even though this had not been included in the original plans. In Birmingham SWITCH responded to the opportunities and needs of a major city centre redevelopment to include sustainable water management practices. Where such changes were made we learned that demand-led research can strongly support stakeholder engagement.

### Communicating science

To ensure learning alliances don't just become talking shops, it is vital to have new content, 'food on the table' in the form of the outputs from research which could influence stakeholders and their work. While talking can be useful in some contexts, such platforms are not likely to be sufficiently challenging and productive to modify ways of working and stimulate innovation in line with the ambitions that SWITCH had. Here the challenge was to encourage researchers to make themselves part of the learning alliances, rather than remaining outside and to adapt their ways of working, schedules and modes of communication to suit. There were some successful examples of how scientific results can be communicated in more accessible ways to enhance the use of research findings. In Accra, a starter kit which brought together many different sets of data and publications to make them more accessible proved to be widely used. In Belo Horizonte, initial attempts to train community leaders in the kind of alternatives that SWITCH was promoting were not so successful. This was because University graduates presented their findings in long technical presentations in the same way they might for a research seminar. After considering the feedback, training approaches were modified to present content in ways that did not need an academic background to understand.

### New opportunities

Stakeholder engagement can lead to new scientific spin-offs, with partners benefiting from the network that has been generated. This is the ultimate incentive for researchers to get involved and invest their time and energies. In Lodz, learning alliance members have been able to secure further funding to continue similar work. Over the next five years they aim to work together to use 'ecohydrologic rehabilitation' to reinvigorate a popular recreational area based on the SWITCH experiences. This includes maintaining a learning alliance to connect the different stakeholders involved and affected. Several consortium partners have also reported adopting the learning alliance approach for other projects. In Birmingham, SWITCH ideas are expected to permeate the Birmingham Water Group that was formed during the project and continues to function. In Bogotá, tanners became involved in their own research to develop less polluting ways of working. Those involved in the research were the most likely to implement it.

## Transferable lessons: Demonstrating new approaches

Several of the city assessments reported that demonstrations were especially useful in engaging stakeholders. The nature of pilots and demonstration projects is that they involve risk. A demonstration project is a pilot: what works here may not work the same way there. But experiments allow people to be convinced by seeing things work. This overcomes the natural resistance to change in their own backyard. The power of something visible is undeniable and provides a useful focus for targeted research, visits and training activities (Figure 1.2.6). Because of the way that demonstrations had to be funded with 65% of funds being provided from non-SWITCH sources, their development always involved partnerships with others such as a municipality or utility. Demonstrations also proved useful in bringing in other stakeholders such as consultants and contractors that were not well engaged in some of the other activities.

Figure 1.2.6 Demonstrations have power: seeing is believing



Where experiments brought more persistent resistance of stakeholders into the open, the barriers could be overcome in some cases. For example in Tel Aviv, the plans for pilot grey-water reuse as part of a sustainable building project brought the resistance of the regulatory authorities, because of health concerns, into clear focus. In Lima, health regulations did not permit growing food with wastewater. Unless those concerns can be overcome, there will be no scaling up. In Tel Aviv the compromise was to allow further development of the demonstration within the more controlled conditions of the university campus. In experiments, risks have to be managed, and municipalities are often risk averse. To circumvent this, a trial infiltration gallery taking stormwater from a busy road was sited on university land in Belo Horizonte, where permissions could be gained fast enough to allow completion and monitoring during the course of the project. While they may have land, universities may not have strengths in the practical realisation of infrastructure projects such as procurement procedures, but it is important that researchers are exposed to these constraints of taking innovations to scale.

Nevertheless, some opportunities were missed. Planning demonstrations, as with planning research, was often not well linked to the learning alliances which reduced the number of interested and relevant stakeholders who could be involved. SWITCH also focused on mainly physical demonstrations but perhaps in some cases demonstrations of 'software' such as new financing mechanisms could have had more impact in the long term. Some smaller demonstrations could also have been usefully started much earlier during the project providing time to generate and monitor impacts.

## Transferable lessons: Platforms for inter-institutional collaboration

### Different types of learning alliances

One key lesson learned was that history, context and the approach taken, including partners and the entry point of the project, were key determinants in the success of learning alliances. Looking across the 12 cities we can identify alliances of the 'old' and 'new'. Some of the alliances such as the Water Club in Tel Aviv mainly brought together existing connected professionals, albeit perhaps with some new tasks and objectives. It is also possible to distinguish between alliances with more controlled, formal and occasional interactions – an example would be Birmingham – and the more organic, multiple-channel and even 'out of control' processes that developed in some cities. An example would be in Lodz where groups within the learning alliance began to take on new activities and to communicate with each other without always going through the facilitator.

Figure 1.2.7 Learning alliances brought together different stakeholders



### No one way of doing things

Another lesson learned was that given the complexities of context, and our different interests in each city, there is no set way of doing stakeholder engagement. There is a need for some principles to contextualise and develop an understanding of the approach and its objectives, and there is a need for a clear framework and steps, but also flexibility in implementation. It is necessary to observe what works, learn lessons and make changes to build momentum and move towards the objectives of the group. This is recognised in the SWITCH transitioning methodology that was based upon the city and learning alliance experiences within the project and provides such a framework for future interventions. In Bogotá there was not even a learning alliance as such, but the Systematic Approach for Social Inclusion methodology adopted has many parallels with the multi-stakeholder platforms in other cities. Visioning, facilitation, redefining problems and understanding that technical challenges have to be addressed within a social context are common themes to all successful multi-stakeholder interactions.

### Facilitating, facilitating

Learning alliances create social capital, they are new networks of relations and they make it easier to find each other. They should make it easier for individuals to connect across departments, institutions and critically across cultures. A key lesson learned was that facilitation is all-important to connect and translate between cultures and domains. Facilitation and related tasks including documentation and communication need a range of competencies that will rarely be found within a single individual unless you are very lucky. In cities where facilitators had a high level of experience and more time on the job, the results clearly showed. Lodz, Accra, Belo Horizonte and Bogotá were all cities where active and experienced facilitators were able to generate collaboration between stakeholders and overcome resistance. Facilitation is not only about the important key moments at meetings and workshops. Processes also need facilitation and that means a different set of skills and often a lot of laborious communications, whether face to face, as works best in Accra, or running a Google group in Cali. The use of information technologies has to be tailored to local situations – not everything is possible everywhere. Writing and communication skills may not always be found with the same person, and given the business and urgency of tasks SWITCH learning alliance facilitators certainly found it difficult to document and reflect on progress. Documentation is not just about keeping records and producing materials. It is a springboard for reflection on what has been done and what has worked well and not so well. So without good documentation there is less likely to be reflection and learning. Training sessions and city assessments were important. In hindsight, the documentation role should have been allocated to another person although scarce resources meant that the learning alliance facilitator had to perform several functions.

In passing, and in the context of communication, city websites were used far less than might be expected. The value of developing and keeping a well-informed website can be seen easily at international level. Within countries however, use of the sites was patchy but this is not unique to SWITCH.

SWITCH showed that successful learning alliances can be led by a university, a municipality or an NGO, but each type of institution brings with it different challenges. Ideally, the organisation hosting and convening the learning alliance should not be seen as being involved in local politics. It should be seen as independent and impartial. It was noted however that involving a local city council would have helped buy-in by urban authorities. Private sector buy-in was

not often realised, but in Zaragoza a manufacturer recognised in SWITCH an opportunity to test and promote its water meters, and donated a large number to the municipality to support SWITCH research on water saving.

As well as good facilitators, SWITCH benefited from some enthusiastic and well-connected champions. Champions proved especially useful in getting the people needed around the table. In Bogotá, one senator who became involved in the work supported by SWITCH even had the ear of the country's President. This served to focus the attention of institutions on conflict resolution which was a key part of reducing river pollution.

### Engaging schools, volunteers and media

Universities are not only research institutions but also educational institutes. Dissemination to the larger society is not always at the forefront of their work. Involving schools, environmental volunteers and the media in learning alliances has proved to present a great opportunity in several SWITCH cities to integrate lessons learned in people's everyday lives (horizontal scaling-up). Children and the elderly, both age groups with time on their hands, can, and have, become ambassadors for the values embraced by the project. In Lodz, photography and art contests provided alternative forms of expression that engaged local people with the SWITCH project. In Belo Horizonte, schools were central to the local learning alliances and mobilising the broader community. One school conducted experiments on rainwater harvesting, another became involved in selecting designs for a wetland to remove pollution, while a third took part in “*um dia na bacia*” (a day in the catchment) when the community visited the local drainage area, identified good and bad practices and organised competitions for young people.

## Transferable lessons: Influencing plans and policies

It was not originally planned as an activity within all cities, but as learning alliances developed, one good decision was to support each city in developing some form of visioning and strategy development process. Scenario-based planning methodologies proved to be very popular with the learning alliances and the participatory development of visions, scenarios and strategies was one of the more effective integrating activities that helped to give the learning alliances more coherence and purpose. These activities helped cities to broaden their focus in several cases – such as in Alexandria where planning became the main focus of the project – and to take on new key issues whose importance to stakeholders emerged, such as stormwater in Lodz. The methodology used proved to be relatively non-threatening (being about the future) and it was new and innovative to the individuals involved and seemed effective in engaging many stakeholders around a joint activity. Almost all city learning alliances developed a shared vision, several developed ‘unofficial’ strategic planning processes which some were able to build upon and influence official planning policies and documents.

Figure 1.2.8 Strategic planning processes proved a good integrating activity



In Tel Aviv it was possible for SWITCH to engage directly with the city strategic planning process, eventually working closely to add water into the mix of issues addressed there; in other cities this was not possible for reasons of timing or credibility. Here, the learning alliances started their own unofficial or project-related planning processes focusing on water issues. To have much impact, it was then important to establish a meaningful link between unofficial or project-related planning, and official strategic plans. Several cities, including Lodz and Accra, appear to have made this link well, and that argues well for the uptake of ideas. For example, in Lodz a plan for water was developed with the city office department responsible for strategic planning which they intend to use when updating the strategic plan for the city.

Influencing national policies requires different levels of engagement and specific efforts but was not always possible given the city scale focus of most of the learning alliances. In some cases it was: in Lima a national learning alliance was established around the wastewater reuse policy. Building upon research and demonstration at local levels, this group was able to develop a new national policy that was officially adopted by the key government agencies. Birmingham researchers felt that their work on mapping in the city informed subsequent national legislation and policy relating to flood management. The degree to which SWITCH was a key factor in this, and the degree to which it was supporting something already on the move is difficult to tell.

**Box 1.2.1 Summary of transferable lessons**

Learning alliances and the overall project approach:

- There is a risk that stakeholder engagement is included in a plan to attract the funding that goes with it, without necessarily getting the attention, resources or management commitment needed for it to be successful.

The SWITCH project intervention logic in cities:

- There is a need to intervene at the right scale, and this is not the same in different cities.
- Project and partner history ultimately has a strong impact on the nature of the stakeholder engagement process.
- International collaboration plays a positive role in bringing new perspectives and supporting learning.

Building the scientific base:

- Demand-led research can strongly support stakeholder engagement.
- Scientific results can be communicated in more accessible ways.
- Stakeholder engagement can lead to new scientific spin-offs.

Demonstrating new approaches:

- Demonstrations were especially useful in engaging stakeholders.
- Where experiments brought more persistent resistance of stakeholders into the open, the barriers may be overcome.

Platforms for inter-institutional collaboration:

- History, context and the approach taken, including both the partners and the entry point of the project, were key determinants.
- There is no set way of doing stakeholder engagement.
- Facilitation is all-important to connect and translate between cultures and domains.

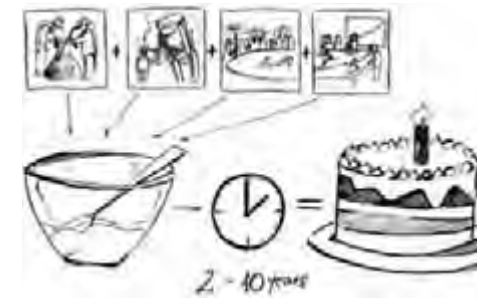
Influencing plans and policies:

- The participatory development of visions, scenarios and strategies was one of the more effective integrating activities.
- It is important to establish a meaningful link between unofficial or project-related planning, and official strategic plans.
- Influencing national policies requires different levels of engagement and specific efforts.

## Conclusions

In SWITCH, the real experiment was to try and combine a mix of research, demonstration, planning and training activities with the learning alliances being the central coordinating activity (Figure 1.2.9). The underlying expectation of the project was that this would add up to more than the sum of its parts in terms of impact. Overall, a well linked mix of activities, good facilitation and persistence, have shown encouraging results in some cities. Given the chance we would do it again, albeit not in exactly the same way. While in every city there were inevitable shortfalls, there were also other things that worked well. These were not always possible to predict: some of the best things that happened were not planned. Learning alliances in the end were seen to have been a good return on the investment made.

Figure 1.2.9 Combining activities was at the heart of the logic of SWITCH



Here are ten possible conclusions that may have relevance for other projects of this nature.

1. It is much easier to 'go with the flow' and put support behind things that are already happening than to start projects from scratch. In almost all of the cities, there was an initiative or underlying problem that some researchers and practitioners had started to address. In the best cases these proved to be fruitful areas for the learning alliance approach, for demonstration projects and for research. When one researcher in Birmingham, suggested that "SWITCH was sitting on a wave that would have come to shore anyway", that is a compliment to the project. It was in the right sea at the right time to catch the wave.
2. It takes a long time to bring stakeholders who are not already working together into an effective learning alliance. If SWITCH were starting again it would make sense to start on this work before fixing the research agenda, so that demand-led research could be a reality. Work could have been phased with much more attention paid to timing.
3. Multi-stakeholder platforms such as learning alliances require dedicated facilitation that must be funded. Facilitators may need to be trained and they certainly need to be nurtured. This is not something that can be bolted on or provided in someone's spare afternoon. This is an area where funding is hardest to achieve, because nobody wants to pay for what they fear might be a talking shop. Without a credible and well trained facilitator, learning platforms will be dominated by the strongest participants.



4. No matter how big the global project, and how grand the launch party, in every city you are the new kid in town, and if you want respect, then you have to treat the existing structures with some respect and work to gain credibility. In Accra, the facilitator knew she had made a breakthrough when, after repeated visits to the Ministry, she began to be recognised and other stakeholders hailed her saying “there is SWITCH!” When SWITCH worked in harmony with the local way of doing things, gains were made. In Tel Aviv for example, the Water Club sounded less threatening to the people who joined it than learning alliance. In Cali, they have a word *platanizado* to refer to an outsider who picks up the local patterns of speech. SWITCH worked best when it was *platanizado*.
5. In order to get people to participate in the meetings and ongoing activities of the platform, you have to make it worthwhile for them to contribute their time and energy. Talk on its own is never enough. Feeding back the results of research and involving them in planning relevant demonstration projects are attractive incentives. Stakeholders must become part of the team so that this becomes part of their useful work, rather than a place to go to listen to other people. This is not just about what happens in meetings. As someone said in Alexandria: “Things need to happen in between the meetings to keep our interest.”
6. Five years passes quickly. A common theme was the slippage of plans so that work started late and time to install and assess demonstration projects quickly runs out. Teams in Alexandria, Accra and Belo Horizonte were working on demonstration projects right to the end of the project, which means there was not time to properly assess their impact. Delays were caused by pressure on the time of key actors or by bureaucracy or by the need to obtain permission from water or sanitation authorities. In Alexandria there was a contradiction between national policy and local by-laws that made it very difficult to put in basic but improved water services because they did not match an unobtainable national norm.
7. Because five years passes quickly, what happens after the project needs to be considered before it begins. In the city stories, the reader will often be left in suspense. Will the learning alliance continue in some form? Will this key piece of work actually be put into effect? A post-project period where there are some (much smaller) resources to follow successful initiatives that are not yet self-sustainable, will avoid wasting the efforts of the project years. In many cases this just means ensuring that the bodies that are picking up the strengths from the project are supported to incorporate them into their institutions and practices.
8. A global project needs a better method of enabling cities to draw strengths from each other. SWITCH had some highly successful international meetings but no effective global forum for the cities to compare notes and share ideas for overcoming problems. It was a wheel with spokes but no hub.
9. Unless there is a method to respond to demand with resources, then the strongest voices will set the direction of work in cities. They might be right. But this method of selecting priorities is not really compatible with the rhetoric of demand-led research. Investigators are advised to ‘follow the money’ if they want to know what and how things happen. Research projects also tend to follow the money.
10. Has SWITCH had an impact? Yes, probably. But would it not make sense to plan some action research now for five or ten years’ time, to go back to the cities and see what is the real legacy of SWITCH?

## References

- Brown, R. R. & Farrelly, M. A., 2009. Delivering Sustainable Urban Water Management: a review of the hurdles we face. *Water Science and Technology*, 59(5), pp. 839-846.
- Butterworth, J. et al., 2010. Local approaches to Integrated Water Resources Management. *Water Alternatives*, 3(1), pp. 68-81.
- Cohen, M. D., March, J. G. & Olsen, J., 1972. A garbage can theory of organizational choice. *Administrative Science Quarterly*, 17, pp. 1-25.
- Duignan, P., 2009. What is 'best practice'? Outcomes Theory Knowledge Base Article No. 237. *Knol Beta*, [Online] Available at: <http://knol.google.com/k/paul-duignan-phd/what-is-best-practice/zm7zd68aaz774/32> [Accessed 29 June 2011].
- Gieryn, T. F., 1983. Boundary-work and the demarcation of science from non-science: strains and interests in professional ideologies of scientists. *American Sociological Review*, 48, pp. 781-795.
- Lee, K. N., 1999. Appraising adaptive management. *Conservation Ecology*, [Online] 3(2), 3, Available at: <http://www.consecol.org/vol3/iss2/art3/> [Accessed 29 June 2011].
- Moriarty, P., Butterworth, J. & Batchelor, C., 2004. *Integrated Water Resources Management and the domestic water and sanitation sub-sector*. (IRC Thematic Overview Paper) [Online] Available at: [www.irc.nl/page/10431](http://www.irc.nl/page/10431) [Accessed 29 June 2011].
- NeWater (New Approaches to Adaptive Water Management under Uncertainty), 2005. *The relationship between IWRM and Adaptive Management*. (NeWater Report Series No. 3) [Online] Available at [http://www.watercentre.org/resources/search-resources/newater\\_wp3.pdf](http://www.watercentre.org/resources/search-resources/newater_wp3.pdf) [Accessed 29 June 2011].
- Warner, J. 2007. *Multi-Stakeholder Platforms for Integrated Water Management*. Ashgate: Oxon, United Kingdom.

## 1.3

Urban revitalisation schemes can serve to make water more visible. (Photo credit: John Butterworth)

# Perspectives on learning alliances as an innovative mechanism for change

By Alistair Sutherland, Carmen da Silva Wells, Bertha Darteh and John Butterworth

## Introduction

The research consortium which made up the SWITCH project brought together over 100 professionals from more than 33 partner institutions from more than 15 countries. These institutions were mainly universities, international research centres and municipalities. While the majority of the SWITCH project research expertise came from a technical and water engineering background, the project design included multi-stakeholder platforms known as city learning alliances.

Aspects of urban water governance and related challenges of rapid urbanisation, climate change, unequal access, institutional and disciplinary fragmentation have received increasing attention from the international research community (Rogers and Hall, 2003; Castro, 2004; Revi, *et al.*, 2006; Semadeni-Davies *et al.*, 2008;). Literature on strategic planning signals the need for and value of more participatory and inclusive approaches to planning and decision making when addressing complex development challenges (Friend and Hickling, 2005), including those facing cities (Kain and Soderberg, 2008). There is also growing interest in the results of applying newer governance models to water management. Moreover, some researchers in the water sector are seeking to increase their impact by engaging in action-research and social learning, working with decision makers and planners to influence the way that water is managed as part of water governance in cities (Salgado, *et al.*, 2008; Brown, 2008; Pearson, *et al.*, 2010).

## Learning alliances and water governance

Learning alliances are a management innovation that emerged from the private sector as strategic alliances. They involve the exchange of knowledge and expertise to help a company improve its performance and competitive edge (Ghosh, 2004). The importance of a social learning process in which researchers play a key role, is recognised in the context of complex environmental resource management situations (Pahl-Wostl and Hare, 2004; Ison *et al.*, 2007). The influence that power relations have upon learning is also emphasised in organisational change research (Contu and Wilmott, 2003). Steyaert and Jiggins (2007) emphasise the need for researchers to play a facilitation role in supporting stakeholders to better understand their own roles in complex natural resource management situations. The underpinning assumption is that researchers should step down from their proverbial ivory towers and actively engage in a co-learning and knowledge sharing process which informs multi-stakeholder decision making in complex situations. Researchers are expected to have more influence on decision making. Figures 1.3.1a and 1.3.1b illustrate one of the changes that was expected of the learning alliances.

Figure 1.3.1a **Conventional research approach: Scientists conduct independent research and share results at the end**

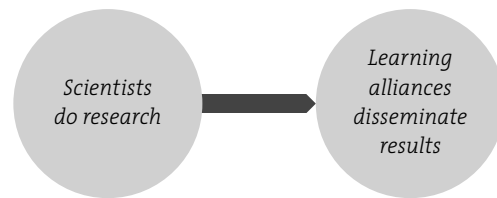


Figure 1.3.1b **Action Research: Scientists are part of learning alliance and working together with others to conduct research while continuously sharing research.**



SWITCH is not the first action-research project in the water sector to use learning alliances as an institutional framework through which researchers can engage with other stakeholders.

Learning alliances as multi-stakeholder processes centred on social learning and knowledge exchange, have been promoted as an approach (Smits *et al.*, 2007) and used in earlier integrated water management projects in the Middle East (Moriarty *et al.*, 2005; Moriarty *et al.*, 2007a and 2007b), a global project on rural water and productive use (Penning de Vries, 2007) and projects focusing on specific aspects of the urban water cycle (Smits *et al.*, 2009a). However, SWITCH is unique in promoting the learning alliance approach in the urban water sector, in large cities that represent a wide range of cultural, political and economic contexts across three continents.

The SWITCH project design also included research outputs relating to governance. A project briefing paper defines governance as, “the exercise of authority and legitimate influence in the management of a city’s water and water-related affairs at all levels of decision making. This includes the complex mechanisms, processes, and institutions through which stakeholders articulate their interests, mediate their differences, and exercise their legal rights and obligations with respect to water management” (da Silva Wells *et al.*, 2008b). The main tasks in governance are: 1. to decide what to do; and 2. to deliver on that decision (idem). In the SWITCH project design there was a clear intention that researchers should have input into urban water management decision making in the participating cities, with the longer-term expectation that some organisations represented on city learning alliances would implement innovative ideas.

### Conceptual underpinnings of SWITCH learning alliances

Learning alliances were based on the premise that when tackling a complex situation or “wicked problem” (Butterworth and Morris, 2007), a group of relevant people working interactively are more likely to come up with better options than a clever individual operating within a command and control model. The underlying assumption was that complex problems, like urban water management and its governance, require creative solutions that involve new types of interaction and engagement between experienced researchers and other stakeholders with key responsibilities and interest in the urban water sector. For some water engineers this was a paradigm shift, challenging the notion that an expert or experts could effectively steer a process as complex as more integrated management of the urban water cycle. For researchers this implied engaging with the real world of decision making and engaging in a process rather than focusing on their research products (Lomas, 2000).

Secondly, learning alliances were seen as key for obtaining better returns on investment in research. The design intention was that a city learning alliance would “facilitate integration and scaling-up of innovation in urban water management” (Morris, 2006) against a background where much funded research had not been brought into use. A learning alliance was seen as an innovation system and a functional action-research mechanism for improving the application of research towards the agreed objective; integrated urban water management: “The central premise of the Learning Alliance approach is that, by giving as much attention to the processes of innovating and scaling up innovation as is normally given to the subject of the innovation itself, barriers to uptake and replication can be overcome” (Moriarty *et al.*, 2005).

For researchers, this requires more attention to stakeholder involvement in their research, and to effective communication with stakeholders. This perspective was reinforced by an emphatic statement from the EU research manager, after hearing presentations at the project’s first scientific conference in 2006: “SWITCH is not a [conventional] research project; it is about getting existing research into use.”

Thirdly, the moral case for learning alliances was made. As facilitators of innovation, SWITCH learning alliances were expected to promote “good governance” in the sense of “greater accountability, participation, transparency and equity in the development process” (Morris, 2006). This view was underpinned by concerns that aspects of urban water governance are influenced by vested commercial, organisational, class and individual interests which would, if not brought into the open, work against fuller integration of water management. SWITCH’s design included work packages on water governance and social inclusion to address some of these concerns (Nelson *et al.*, 2008).

The learning alliance approach was viewed in the SWITCH cities and by the research sector as an opportunity to intervene by bringing in international research expertise to tackle complex and location specific urban water problems in a way that was different from previous efforts (Howe and van der Steen, 2008). Project learning alliances were seen as “a key for engaging multiple stakeholders and bringing together their diverse perspectives on a problem and its potential solutions, and enabling new ways of working to emerge” (Morris, 2006). The time-frame proposed for implementation was that in year one, city learning alliances might commission research activities from the project partners, as a process of “demand-led” research (Morris, 2006). By year two, there could be more emphasis on stakeholders collaborating as part of an action research process. By year three, learning alliances were expected to deliver a wider range of benefits including fostering a new form of demand-driven research. They would also

be improving communications between water sector institutions, increasing the scientific basis for decision making, helping to break down political barriers to solving urban water issues, ensuring better representation of stakeholders in decision-making processes and showing that the learning alliance approach “is feasible and results in more rapid adoption” (Howe and van der Steen, 2008).

### An overview of the project stakeholders

At the project design stage, a project briefing paper (Morris *et al.*, 2006) identified the three main types of actors or stakeholders involved in SWITCH city learning alliances as:

1. Project consortium members, mainly researchers, who aspire to more integrated urban water management that is sustainable, less risk prone and more equitable.
2. Stakeholders with interests in integrated urban water management (IUWM), and particularly those associated with project themes or work packages being focused on the city (e.g. city planners, regulators, utility operators, politicians and civil society organisations).
3. A coordinator – ‘head chef’ – to champion the alliance, and a team of enthusiastic co-workers to support him or her.

The description of the learning alliance experience in this chapter draws on views expressed by these three stakeholder categories, backed by the authors’ own observations. The analysis of their views builds on the project conceptualisation of learning alliances at the design stage (Morris, 2006) and draws heavily on a recent review of effective strategic cross-sectorial partnerships which focuses on the “social innovation” process (Le Ber and Branzei, 2010). A conceptual framework which aims to capture the key elements of an effective social innovation process is used to make sense of the stakeholders’ views of learning alliances and experiences of the project at various stages of implementation. The challenges, lessons and implications for scaling up a learning alliance approach as a method for promoting innovation in urban water management and governance are discussed.

**Researchers:** The majority of the researchers in the consortium had a technical or engineering background related to the water sector and were involved in one of five thematic work packages (Howe and Van der Steen, 2008). These five work packages were led by experienced researchers, specialists in their fields, mostly with consulting experience and a commitment to bringing their expertise to bear on water management challenges. Other technical researchers involved include a group doing their PhDs through the project. There was a small group of social scientists with water sector experience who were involved in the project’s sixth work package: Governance and Institutional Change. Learning alliances fell under this work package, and were under the overall coordination of a member of the project management team which was made up entirely of researchers. In all the participating cities, researchers from nearby universities were involved. In addition, researchers from European research organisations supported the city learning alliances or local research teams.

**City Stakeholders:** In each city, researchers engaged with stakeholders who were considered important to achieving the project aim, including experienced engineers in charge of water related services or with a regulatory role relating to water and environment. Also included were city planners and politicians, and sometimes, civil society representatives with involvement in the water sector. In a few cities private developers were represented. City stakeholders had greater diversity of interests and function than project researchers. In three cities (Hamburg, Bello Horizonte, and Zaragoza) the municipality was funded as a partner by the project.

**Learning alliance facilitators and city coordinators:** The establishment of learning alliances was a challenge during the first year of SWITCH. In early 2007, the project management team allocated resources specifically to engage learning alliance facilitators and for operational costs such as workshops and communications. At this point each participating city had a senior researcher as coordinator, and in most cases they selected someone with a water engineering and consultancy background to facilitate the learning alliances, although the facilitator in Hamburg had a planning background and in Lodz the facilitator had a background in mediation and conflict resolution. From 2007 to 2009, learning alliance facilitators were offered training in facilitation skills and process monitoring and documentation, and met to review and share experiences. Some cities took more advantage of this than others.

## Methodology and analytical framework

A series of semi-structured interviews using open-ended questions was conducted at different stages of the project with a cross-section of project stakeholders. The interviews were conducted within the cities as part of city assessments undertaken in mid-2008 and early 2010, and when researchers and other stakeholders were participating in four project scientific meetings held between January 2007 and October 2010. In November 2009, city stakeholders were invited to a SWITCH City Water Summit held in Delft, the Netherlands, during which representatives from Accra, Tel Aviv, Hamburg and Lodz were interviewed about their views on learning alliances. City stakeholders from other cities (e.g. Birmingham, and Belo-Horizonte) were interviewed during internal progress assessments.

The results from two sets of interviews conducted in 2007 were analysed and later shared via the project website (Da Silva Wells, 2007; Sutherland and Darteh, 2008). The authors were also involved in the internal city assessments, which involved visits to cities and interviews with city stakeholders and researchers involved in these cities. Interviews with project stakeholders are supplemented by ‘insider observations’ made during attendance of various meetings, during training of the city learning alliance facilitators, in work packages covering socio-economic aspects of urban water management and in workshops and informal interactions with various project stakeholders. One of the authors was on the project’s management team.

The views of the three main stakeholder categories and the observations made by the authors have been used to construct an actor-oriented narrative which identifies some common ideas, trends in the evolution of learning alliances and outcomes from the learning alliance process.

Some key elements for an effective process were considered. These included:

- design and implementation process, including effective facilitation
- selection of partners
- development of implementation procedures
- grappling with complexity in a process of social learning
- fostering effective relations between organisations so that levels of engagement increase
- partners adjusting their roles to sustain momentum
- effort that is persistent and unusually demanding

These core elements are also part of an ideal three-stage stakeholder engagement process for successful action-research. The process starts with an altruistic phase when potential partners are prepared to commit inputs into an uncertain multi-stakeholder venture; in the case of SWITCH, they are asked to commit to participating in a city learning alliance without knowing whether they will receive any direct benefits from it. This progresses through increased engagement and testing of trust into the second stage of a series of transactions with some expectation of future benefit, which may be a general goal such as an agreed vision and/ or strategy for water management in the city. The process reaches its integrative stage when tangible results are in sight – which in this case may be to start implementing an agreed strategy for improving water management. This might involve developers, planners, regulators and service operators working together as part of an urban regeneration project or urban expansion.

Directive and command and control decision making and implementation styles make way for a more consensual approach to decision making involving multi-stakeholder negotiation and planning efforts, followed by a more cooperative joined-up approach to implementation.

## Establishing SWITCH City learning alliances

### Overview

Starting in 2006, SWITCH established city learning alliances in nine cities: three in Europe (Birmingham, Hamburg and Lodz), three in Latin America (Belo Horizonte, Cali and Lima), and three in Africa and the Middle East (Accra, Alexandria and Tel Aviv). Different approaches and trajectories were followed in Beijing, Bogotá and Zaragoza, and some exploratory activities were at one point also started in Chongqing, China. Each city learning alliance developed and functioned according to its own evolution. Box 1.3.1 summarises activities that were implicit in the project design and were undertaken in most cities.

#### Box 1.3.1 Summary of learning alliance related activities

1. Stakeholder analysis and scoping – to identify who to involve in city learning alliances.
2. Start-up/launch meetings – to introduce stakeholders to the learning alliance concept, identify common issues and problems, and introduce the research planned/under way in the city.
3. Topic specific workshops/meetings – often with a training element, to build stakeholder capacity for improving water management in the city e.g. urban agriculture, natural systems, stormwater management, decision support tools (City Water Model), waste-water treatment.
4. Workshops to develop a vision for water and provide training and guidance in strategic planning.
5. Learning alliance meetings to report on progress with research, plan demonstrations and share updates on SWITCH activities.
6. Networking and presentations by learning alliance facilitators – to promote the concept of multi-stakeholder engagement around integrated urban water management.
7. Meeting with and training community based organisations – especially in Belo Horizonte, Accra and Lima.
8. Involvement in city regeneration initiatives – especially in Hamburg, Birmingham and Lodz.
9. Planning demonstrations of integrated urban water management.
10. Communication activities, including setting up city websites to link members of the city learning alliance.

### Early challenges

The first challenge was the concept of demand-led research, which proved to be difficult to implement in all participating cities. The idea is that stakeholders who want to see innovation in use, have input into the decision about where researchers concentrate their efforts. Under the EU process and rules, partners in the consortium are required to sign up to topics and research deliverables when they seek funding. Rather than shape research through an interactive process and dialogue with city stakeholders, the tendency was to define specific research products, including PhDs on specific topics, before the learning alliance was even established. EU rules on matching funding for research imposed practical restrictions on researchers moving between cities and encouraged researcher-driven research rather than demand-led research. The project design and rules on partner organisations did not permit city learning alliances to use the project budget to commission research, to subcontract work or sign up additional partners. This all worked against city learning alliances to address what they saw as the priority issues for their cities.

The idea of a “coordinator and team of enthusiastic co-workers” (Morris *et al.*, 2006) to initiate city learning alliances also proved difficult. In 2006, there was no specific budget line to design, establish and facilitate the city learning alliances. Any activity in this direction needed funding

from other budgets linked to specific project deliverables. There was an expectation that research budget holders would use their resources to support the establishment of learning alliances as they were a key part of the project design, and/or that participating cities (as potential beneficiaries) would fund them. This expectation proved to be naïve. In the second year (2007) project management created a budget line to enable learning alliance facilitators to be recruited and trained. By the end of 2007, most of the cities had a designated learning alliance facilitator.

### The context for learning alliance development

Each learning alliance operated within its specific context: historical, cultural, demographic, institutional, infrastructural, economic and political.

The context in participating Latin American cities was that water supply services had been developed to a relatively advanced level, the remaining engineering and institutional challenges were mainly related to wastewater and stormwater management. The wider governance context was one of participatory democracy, which was more developed in Brazil (Belo Horizonte).

In Europe, the context was that participating cities have relatively well developed water services and institutions with clearly defined functions but aging infrastructure, relatively weak civil society engagement in the water sector, and ongoing regeneration initiatives. City learning alliances became involved in urban regeneration programmes in Hamburg, Birmingham and Lodz, seeing these as opportunities for introducing new thinking about urban water management, facilitating multi-stakeholder engagement and including formerly marginalised stakeholders into the water management process. This strategy was taken furthest in Lodz, where the learning alliance approach spread into other sectors and took on a life of its own well beyond the project's boundaries (Wagner *et al.*, 2009).

In Accra, rapid urbanisation, poverty, patchy water and sanitation service provision, weak linkages between agencies and weak municipal involvement in water services made engagement with municipal authorities a major focus of the learning alliance.

In Alexandria, where water is a high profile issue and there is a complex and highly evolved institutional framework for water management, the main driver was to achieve greater efficiencies and address the issue of how to provide improved water services to poorer settlements not connected to mains networks. Rules of protocol needed to be observed, and power and authority relations in the water sector had to be well understood for the learning alliance to have any significant influence. The focus was on integrated strategic planning and an extension of the network to achieve an informal settlement.

In Beijing, the sheer size of the city and complexity of its water management and institutions, together with the protocols about how business is done, made the idea of a city learning alliance unworkable. Instead, key stakeholders focused on a part of the water cycle where innovation could address integration issues, and relied on known and trusted institutional mechanisms for stakeholder engagement and decision making.

In Tel Aviv, a centralised and well-engineered modern and evolving water management system provided an opportunity to showcase and further develop technology as a demonstration that

included a research element. A further opportunity, in the context of water being a highly strategic and sensitive issue, was weak linkages between municipal authorities and national water operators. The learning alliance provided a mechanism for integrating water into strategic planning for the city and for developing sustainability indicators to monitor progress into the future.

## Findings

### How well did the learning alliances address key processes?

These were the contexts into which learning alliances had to achieve meaningful engagement between researchers and other stakeholders around water management problems. This was not easy. Research and technical expertise was not always available to explore water management issues raised in learning alliance meetings. Project researchers could decide for themselves whether or not to attend meetings and, if they did attend, how to engage with other stakeholders, if at all. More typically city learning alliances were a forum into which researchers, as recognised experts, could introduce their own research ideas.

In the latter half of 2007, project management explicitly supported efforts to influence city water management planning processes via 'visioning' workshops and training in strategic planning processes. This was in recognition of the need to provide city stakeholders with a vision of what SWITCH was trying to achieve and how they might be involved. So how successful were the learning alliances in achieving the points that were noted above as key elements for effective processes?

### A deliberate design and implementation process

The SWITCH project provided a relatively clear design for the contractual relations between organisations receiving EU funding for project activities. Nevertheless, the scale and geographical spread of the project and the breadth of its mandate provided space for the details of implementation to be shaped in each city and within each work package. The project design posed a number of risks to the learning alliance approach. The first was that researchers and research organisations would effectively hold all decision making power. Senior researchers holding budgets could simply produce research outputs using a conventional approach rather than engage in an action research and learning process. Lack of budgetary provision for learning alliances was a further risk. This was exacerbated by a view in some cases that because researchers are bringing expertise, the cities that stand to benefit should contribute towards the learning alliance costs. A further risk was that researchers who lacked experience of action research would find it difficult to conceptualise what the project required of them and engage proactively with other stakeholders.

Despite these risks, researchers and learning alliance facilitators suggest that in most cities a critical mass of the partners worked progressively towards achieving a clear process for stakeholder engagement. A clear objective for learning alliances is especially important because it is not intuitively obvious why they work. Three years into the project, when asked about challenges, one facilitator replied: "Firstly, it was a challenge for me and others to understand

the idea of a learning alliance. Secondly, it was a challenge to believe that it could work and see the potential benefits. Thirdly, convincing learning alliance members was a challenge. This will be easier now that we have a well-defined objective.” This suggests that developing a clear objective for a particular city learning alliance was the outcome of a process of engagement that took years rather than months.

In January 2007, during the project’s first scientific meeting in Birmingham, project researchers were asked about their understanding of learning alliances (Da Silva Wells, 2007). Some highlighted the benefits of general communication and collaboration seeing learning alliances as “a place where people mix and talk and learn from each other”, or “a vehicle for establishing collaboration and the inclusion of different stakeholder groups.” Other researchers saw learning alliances as providing outcomes such as “dissemination of research results” or “a way to tap into different sources of knowledge” combined with “ways of securing more funding and ensuring successful application of innovations”.

In December 2007, researchers attending the project’s second scientific conference in Tel Aviv were more specific about what learning alliances might achieve within the lifetime of the project (Sutherland and Darteh, 2008).

Researchers indicated that learning alliances should:

- Articulate city needs and “ensure that demand-led research is relevant to the city”.
- Develop a shared vision and strategies to implement integrated urban water management and be a forum for understanding issues and for long-term thinking.
- Link researchers with the cities and with SWITCH, and engage other stakeholders with research - “enable working together, as water is both multi-sectoral and cross-sectoral”.
- Perform functions relating to planning and innovation: “discussion of issues of interest, decision support models and a platform for demonstrations”.

Two years later, the most striking development in the views of researchers attending the project’s fourth scientific conference in Delft, was an increased emphasis on learning alliances as an effective multi-stakeholder process that could focus on more specific purposes. Learning alliance facilitators from various cities gave examples of what the focus should be:

- **Institutional collaboration for innovation** - “The real problem is not a technical problem, but the lack of institutional collaboration, long term visions and openness to change and innovation. Learning alliances could help overcome these problems.” (Cali).
- **Participatory decision making** - “Learning alliances are a kind of democratisation of information to help the population make decisions about water.” (Belo Horizonte).
- **Participatory action-research** - “Working at local level to bring together researchers and research users (schools, municipalities or private sector) to do research together, analyse situations, test solutions.” (Lima).
- **Feedback for researchers** - “To help researchers determine what is useful and what is not useful about their work.” (Birmingham).

By 2009, some researchers from outside Europe were emphasising the initial concept of a learning alliance, as organisations that harness stakeholders for joint learning and action research. “Stakeholders put in resources – time, funds, effort, share ideas, challenges, problems and solutions and learn from one another...”; “to get into action, you need all who are involved in the problem to be on board...”; “action research, as opposed to purely academic or laboratory research, is not possible without involvement of stakeholders.”

Researchers attending the City Water summit in Delft were also thinking about learning alliances more specifically in relation to decision making. Views differed on this aspect. One researcher felt that “learning alliances should not be decision making bodies”, while another felt that “the policy and legislation aspect is crucial”, arguing that, “implementing sustainable urban drainage systems (SUDS) needs us to bring policy makers into meetings with the regulators.” There was support for “involving stakeholders in the decision-making process”, while one facilitator proposed a more formal decision-making role for the learning alliance: “a kind of parliament for discussing water issues and making decisions so far as it is possible”. Another agreed “the learning alliance should be a platform in which actual decisions are taken, in the short and long term, in the city and should work through the stakeholders to achieve these actions.”

In 2009, the project was criticised by external reviewers for lack of integration of the work packages. Interviewed afterwards, members of the research management team emphasised the importance of learning alliances for project effectiveness. One described city alliances as “crucial to ensure uptake of research activities in SWITCH” and another as “the mechanism that will create the imperative for change in the way water is managed.” Another pointed to the potential of learning alliances to influence planning and decision making. “Learning alliances are the method for linking scientists to practitioners and people in cities to ensure our science is relevant, and to bring together city participants to plan together in a more integrated way.”

One management team member contrasted the theory of learning alliances with practice. In theory, “the learning alliance is a multi-stakeholder platform to define research needs, steer research, upscale innovations - both horizontal and vertical learning and integration.” In practice: “upscaling of innovations is the weakest point – some learning alliances are not at the right level for the strategic planning.” However, the same person acknowledged that at least one learning alliance had become a platform where ideas about future cities could be formed, considered and discussed as well as a place for sharing ideas on research and demonstrations.

### With effective facilitation

Evidence from SWITCH supports the literature (Stayeart and Jiggins, 2007) that effective facilitation is a key element for successful change management and action-research processes. Where facilitation was missing, city learning alliances failed to become well established. In 2008, the project management team decided to allocate future funding to a smaller number of city learning alliances based on a series of city assessments. These assessments found functional and well-valued learning alliances where facilitators had been carefully selected, took their task seriously, attended training, were consistently available and were well supported by the city coordinator. Otherwise, learning alliances were observed to be of limited effectiveness, tending to re-enforce rather than challenge existing ways of working. In November 2009, a city stakeholder from Hamburg lamented the departure of the facilitator, stating: “Since X went away, there has been very little communication”. A city stakeholder from Accra noted how the efforts made by a facilitator impacted positively on members of the alliance: “I have seen Y’s confidence grow over time and that of the others who work with her, including the way they present in meetings and the general way they interact.” The skills of a facilitator are mainly in human interaction. One facilitator with an engineering background noted: “It’s not like an engineering process with clear steps”.



Many senior researchers needed to be convinced of the need to have learning alliance facilitators at all. They often recruited someone who was younger, more junior and part-time. In some cities, where the senior researcher was clearly 'the boss', this limited the extent of the facilitator's initiative and activities.

### Selection of partners

Selection of the right partners is emphasised in literature on action-research (Stayer and Jiggins, 2007) and cross-sectoral partnerships (Le Ber and Branzel, 2010). In the SWITCH project, selection of the main partners for action-research and learning was mainly by the leading project researchers and learning alliance facilitators. The core group was in this sense led by the researchers rather than by other stakeholders. Other partners were drawn into the learning alliance process as project ideas were worked out within the consortium and in each of the cities. Through a process of exploring personal networks and scouring the internet to make contact, a core group of research partners developed during project design. It is worth noting that the original design meetings for the project, convened by UNESCO, were all in Europe and were unfunded. So to a great extent, individual researchers self-selected because the project aligned with their interests.

However, many of the SWITCH cities were far from Europe. A researcher from Ghana explained: "I was part of the proposal development group, when the idea was conceived. I got into discussion with IRC [one of the core consortium partners] and together we developed and proposed what should be done in Accra, and proposed Accra as a demo city. The idea of urban water management was in line with what I was doing so it was great opportunity to take this research further." By contrast a researcher based in Europe felt that their involvement had come about purely by chance: "We had a relationship with the Burkina Faso Ouagadougou School of Engineering, and a student... gave my name to IRC and I joined the first meeting. I was attracted to the mix of sciences – social sciences with the harder sciences... for added value and synergy."

In other cases, researchers became involved because their organisations were already involved, and they were attracted by what was on offer. One said: "My first job after my PhD was working with stakeholders and I wanted more of this type of interaction." Another was asked by the University department to get involved and agreed "because I had been working as a water engineer in a water company so found the idea of demand management attractive." A third was enthusiastic "because this is a big project and it sounded interesting."

The Internet was also used to bring in new organisations. The group at Middlesex University that coordinates the stormwater management theme in SWITCH was contacted after someone from the original group Googled 'water management' and found them. They signed up because they liked what they saw. "I wanted to do research that was useful and work with stakeholders to get results", said a member of the team.

Later, a limited number of additional organisations and individuals were invited to join the project because of particular skills or because their ongoing activities fitted with the project goals.

The project design included a process of stakeholder analysis for each city and this guided the selection of stakeholder partners invited to attend the first learning alliance meetings. The inclusion of previously known and trusted partners was important for "risk management" (Le

Ber and Branzel, 2010). However, the wide scope of the project influenced researchers and learning alliance facilitators to be as inclusive as possible when establishing city learning alliances.

In some cases the complexity of urban water management issues made it difficult to decide how widely to reach out to partners. One researcher noted: "At first I thought representation should be broad to include various organisations not directly involved in water management. I later came back to the view that the learning alliance should cover mainly water management, urban planning and ecological actors as the most important ones." During scoping, water related stakeholders were defined, and the learning alliance was later enlarged to include stakeholders with relevant responsibilities.

An aspect of inclusion was the role of NGOs. One UK based researcher lamented that "NGOs need to be more prominent, but there are not many in the city who are involved with water and environmental issues." However, a researcher from Lodz discovered through the learning alliance that there was more going on in the city than was obvious on the surface: "Before the project I had no idea about the NGOs around, and the scope of their actions. Through interactions with different groups of people I discovered the power of the 'bottom-up' movement as a force to reshape the city. The learning alliance proved that my earlier view of the city as dormant was a wrong perception. I discovered there were forces for change at work."

The idea of achieving balanced representation was also emphasised. The recipe for one researcher was: "broad representation, not too much from government, a few researchers, NGOs and concerned citizens."

In some cities, notably Lodz, Cali and Birmingham, efforts were made to bring (private) property developers into the learning alliance process. These developers did not have a specific institutional mandate related to water management, but an opportunity was seen to put water management research ideas and products into practice. Carlos Mauricio Posso, manager of Constructora Buena Vista in Cali, found the SWITCH concepts of interest to his company because of an increased demand from customers for houses with "green" credentials (Lobina *et al.*, 2008). SWITCH concepts may also reduce costs. For example, if water saving devices can be introduced, the diameters of sewerage pipes can be reduced. However, he foresaw limitations because of the strict appliance of municipal norms. He sees a role for the alliance in identifying limitations to applying SWITCH concepts and related innovations in new housing development.

### Partners develop procedures for implementation

Apart from the project proposal and some training on facilitation there were no set guidelines about how to establish and manage a city learning alliance. The three categories of stakeholders – consortium members, city stakeholders and coordinators – had to grapple with rules imposed by the funding conditions, initiatives from influential researchers within the project and specific norms and patterns of interaction in the cities.

This daunting challenge was, in many ways, not tackled head-on. Instead of using learning alliances as a focal point for interaction, researchers gravitated towards other researchers with whom they could communicate easily. In the first four years of the project, annual scientific meetings and more specialist meetings and workshops were familiar to all attending and not a challenge. In the fourth year, the City Summit in Delft provided an opportunity for interaction

between city decision makers and researchers in the project from multiple cities. The outcome was a success in terms of information sharing and motivation of city leaders in the direction of more sustainable urban water management. However, the question of how city learning alliances should operate to support the desired direction of change was not fully explored.

A Europe-based researcher who has worked in Asia, Latin America and the Middle East felt that learning alliances were a good idea but “the conditions needed for establishing them are critical...the objectives are very clear but I am not sure if the idea works for all cities.” This researcher noted that where decision making is top-down and researchers are not experienced in responding to demand, a multi-stakeholder learning platform might be too challenging to be accepted. On the other hand, a UK researcher familiar with participatory planning processes noted: “I am not sure how different [the learning alliance] is from public participation programmes already in place in municipalities.”

This implication of parachuting a concept into a specific urban setting, with its own history and culture, may be reflected in the unease in some cities about using the term learning alliance. In Tel Aviv the term ‘water club’ was chosen to fit a context where a relatively small group of like-minded stakeholders with clearly defined interests and organisational functions, met semi-formally to discuss issues, share information and solve problems. In Alexandria, researchers indicated that the term learning alliance did not sound official or serious enough and more official sounding names were suggested.

A researcher based in China (Beijing) noted the importance of both language and social status and how these limit the scope of engagement in the action research process: “Planners and policy makers are used to working together, there is respect for researchers and they speak the same language. It is more difficult to have discussions between policy makers and farmers. Here there’s an issue of hierarchy and authority.” Differences of power/status were also mentioned in other city learning alliances. One researcher attending the Birmingham learning alliance felt that representatives of higher level authorities and interests were not as forthcoming as they could be in sharing information during formal meetings.

Learning alliances were established in most cities and “rules of the game” were worked out in context. Cities recognised the need to create and preserve a neutral space where differing views could safely be aired. In Birmingham it was agreed that meetings should be in the afternoons and no longer than 2.5 hours so that they did not overly impact on people’s day jobs. In Accra there were discussions about how participation in the learning alliance could be funded, in a context where it is normal for participants in a meeting to receive some form of allowance for attendance.

One feature that distinguished SWITCH from business as usual was use of demonstration projects to support the action research process. This idea seemed to quickly gain support as an acceptable procedure for promoting innovation. A city stakeholder in the Birmingham learning alliance said: “You need demos to make people see that they work in practice and not only in theory.”

### Partners grapple with complexity in a process of social learning

Project participants have grappled with aspects of complexity, as part of a social learning process. Some reflect the natural feelings of frustration entailed in a process of managing the

twin processes of running a city learning alliance and of learning between 12 different cities. After five years, the sense is that each of the project stakeholders has gone as far as they can in being willing and able to grapple with complexities involved in managing relationships and interactions in the project itself, and in the water management situation in particular cities.

The process of social learning requires researchers to stretch their boundaries or to cross existing boundaries. One EU based researcher looked back on four years’ work, saying: “I have picked up the idea of an integrated approach to issues, not what is in the box....The project helped me to have a broader picture.” Another said that the project helped her to realise her idea of what research should be like: “It supported the idea of modern ecology, open to a range of solutions and approaches. I also liked the learning alliance methodology for working with stakeholders.”

The societies where the learning alliances worked are complex, with differences in languages, power and other aspects of social differentiation. Belo Horizonte’s learning alliance facilitator felt that the learning alliance could help in “overcoming political and social issues in bringing different groups together; [leading to] empowerment of marginalised groups within the city so they can also participate.” However, in most cities social differentiation proved difficult to address. This was because of the large number of different stakeholders and the communication difficulties that representatives of marginal groups faced in big meetings dominated by the more powerful water related organisations.

The project design assumed that the complex problems in particular cities could be helped by sharing the knowledge and experience from other cities, but this was difficult to realise. In 2009 a learning alliance facilitator commented: “Getting information and ideas from other cities to feed into the learning alliance meetings is a challenge. In this respect not having a budget to travel does not help, and the [SWITCH project] website is not easy to use either.” In 2010, another researcher commented: “It is a huge project and this makes it hard to have an overview. We are all on just a bit of it. A lot of information we are not aware of because it is simply too big.”

### Fostering effective relations so that levels of engagement increase over time

There has been a triple challenge in fostering effective relations and engagement: between key stakeholders (including researchers) in participating cities; between researchers within the whole consortium; and between participating cities and international researchers from outside those cities (referred to at project design stage as the ‘global learning alliance’).

#### Within cities

A premise underpinning the SWITCH project design was that ‘organisational fragmentation’ was a major barrier to achieving more integrated urban water management in most cities. In Latin American cities, where a relatively uniform and progressive governance framework already existed, the need to achieve fuller integration and improve relations between organisations was flagged (Smits, *et al.*, 2009b). In European cities, as well as institutional fragmentation, there was a challenge from aging infrastructure which the cities could not afford to rebuild, limiting the scope for technical innovation in terms of integration. This was most marked in Birmingham, where the UK centralised water governance arrangements made the task of integration at the city level particularly challenging (Green, *et al.*, 2007). In 2009, an EU based researcher who had engaged with SWITCH, highlighted the way that national water

governance contexts can be reflected in the learning alliance: “In Belo Horizonte, the learning alliance is more structured and owned by the municipality and the University works from within the framework. In Birmingham, the learning alliance has less structure. Each group has its own vested interests so it is more difficult to have a major achievement.”

In some cities, water governance arrangements were linked to rapid urbanisation, high levels of demand on water supply and sanitation services, and increasing competition between various uses of water and relatively more opportunities for technical innovation. The specific historical situations in these cities, each with its distinct cultural and governance heritage, meant that the researchers and other stakeholders had to feel their way in terms of building and strengthening relationships between organisations and key stakeholders. However, comments from stakeholders in a selection of participating cities suggested that learning alliances were indeed addressing the need to improve relations between key organisations.

**Tel Aviv:** In 2009 a city representative from Tel Aviv said: “At first the project started without the municipality. We are only involved through the university. They are not us and that creates a difference.” Another city stakeholder, interviewed at the Delft City Summit, felt that they were only able to influence events once they had grasped the big picture. “I was involved in the strategic plan for Tel Aviv before I was fully aware of it.... When I learned about the city strategic plan, and that it did not include water, I became worried about this because water is a major national issue and there is awareness about this all over the country. After learning about strategic planning I made an effort to open up the city strategic plan and include water in it.” However, another Tel Aviv city representative more closely involved in research, seemed to feel a much lesser need for major changes in approach, but for more specialisation. “We found there was no need for all those meetings... the research and strategic planning groups are separate..... we are not meeting with the authorities and water users, such as farmers, constantly, but through the water club, every six months or so.” The comments suggest that some stakeholders were seen and felt to be more central to the processes than others. The core members felt more comfortable to proceed in sub-groups and report on progress in the Water Club meetings.

**Accra:** Comments from Accra stakeholders also suggested differing histories and levels of engagement and an awareness of the need for more collaboration. An Accra city representative emphasised the challenge of linking the learning alliance to levels of decision making at city and national levels: “It requires buy-in from decision makers and changing attitudes among public and municipal departments. Normally water issues are dealt with at national level and city planners don’t deal with each other daily. We need to create linkages between the different levels.” During the city assessment in 2010, one stakeholder remarked: “From attending meetings I realised that there were departments that are doing their own thing especially where there should have been collaboration. Our eyes are being opened that it is better to collaborate and have a strong link between the assembly and other stakeholders.” Another stakeholder explained how SWITCH had opened their horizons: “We have shared experiences and learnt from ourselves. I met a good group of people I don’t meet normally, realised it is an opportunity to meet a lot more partners. Now I’ve started meeting some of them on other issues e.g.... sustainable development.”

**Lodz:** A city stakeholder, who admitted being a sceptic at first, became convinced that learning alliance meetings brought real added value and sense of common purpose: “It is important to understand what everybody wants so we can understand what investment is needed. In the beginning, I thought it was not useful. I thought the learning alliance was artificial and created

for a reason that was not clear to me. Now, it is useful to have everyone in one room at one time to talk of the problems and come to the solutions. People work together but this togetherness is not the same as when we meet.” A researcher from the University said that the SWITCH team were much more positive in terms of engaging with the city: “I was very shocked to find that the attitude in the university is that we cannot achieve change in the city. There are so many barriers and the researchers seem like dinosaurs. They are interested only in their lab results. In the SWITCH team the attitude is very different and there is a positive energy, a supportive environment and they say “let’s do it!” A number of project researchers stressed the value of learning alliances for engagement: “Face to face interaction - nothing can replace this”, said one, while another referred to the benefits of “three-way discussion: research, operators and inhabitants.”

### Between researchers

The tendency for each work package to be semi-autonomous, and not integrated with city learning alliances, continued to be a concern well into project implementation. At a meeting in Hamburg during the first year of the project, an effort was made to get researchers more engaged with city problems and this issue was revisited a year later at a meeting in Tel Aviv. However such efforts were not sustained or followed up by project management. In 2009 a member of the project management team observed: “The learning alliances seem isolated from the other work packages. The learning alliance approach is the philosophy and cornerstone of the SWITCH project, but it is not shared by all of the work packages.” To address concerns raised by an external review of the project in 2009, project management formed an ‘integrator team’. In practice the team did not develop and movements towards integration were largely voluntary. In retrospect, a project inception report or meeting might have addressed the risk of poor integration at an early stage, as by the time the issue was raised the direction of research in the work packages had already been set.

### Within the global learning alliance

The early idea of a global learning alliance enabling city learning alliances to exchange experiences and learn from each other and from international researchers, was part of the project design. However, this was not funded as it was already proving difficult to carve out enough funds to support city learning alliances. One person who initially facilitated a city alliance remarked: “The reality on the ground is that the city alliances are struggling to see the bigger picture.” In his view, the City Futures Summit could have helped create greater buy-in if it had taken place earlier in the project. Other opportunities included a meeting in Zaragoza where mixed delegations from SWITCH cities met each other. However the project communications strategy looked the same as those for other research projects and didn’t clarify the implications of a multi-stakeholder global action research project and the role of the learning alliances. The project had an occasional newsletter that tended towards one-way communication but no website where people could interact nor an email list server for sharing information.

### Partners deliberately adjust their roles to sustain momentum?

The “let’s do it!” statement quoted by a researcher in Lodz suggests that some researchers did manage to change their conventional roles and become involved in the action.

However, there was little direct evidence of project stakeholders adjusting roles to sustain momentum for change. In many cases, city learning alliances encouraged project stakeholders to cross boundaries and think in a wider context, but sometimes this simply highlighted the

gaps that needed to be crossed. The Head of Lodz's water infrastructure department noted: "Communication, particularly between different levels of hierarchy within the city administration, is difficult. Working out common ways of working remains a challenge... [especially] shared decision making with regard to planning and strategising as we have different visions at the moment."

Others felt that the alliance showed them the road to achieving what needed to be done. An Accra stakeholder stated: "We realise SWITCH helps us to come up with innovative ideas for doing things and move us into new ways of doing things." A city engineer from Lodz emphasised the value of forging links and improving the flow of information: "Through the learning alliance I first met some people that I only knew by name before... the learning alliance has enabled the participants to send signals about key issues to the city authorities and to open the eyes of people to areas that are beyond the scope of their own jobs... I would now like to see a higher intensity of meetings and events including smaller workgroups to take up specific issues."

These comments emphasise the scope for a learning alliance to go beyond a technical innovation process, and engage with a decision making process and develop working relationships with other sub-sectors in the city. This supports one of the key ideas underpinning learning alliances that "switching emphasis from researchers devising new technologies – doing different things – to improving how the multiple stakeholders in the innovation system work – doing things differently – will lead to interventions having greater impact" (Butterworth and Morris, 2007).

To have achieved a more substantial shift in the role of key stakeholders would have required more radical changes to the project at an early stage. The project retained money and power in the hands of the research organisations and senior researchers, and did not attempt to re-define deliverables. The city demonstrations did provide some scope for stakeholders to adjust their roles, but proved difficult to implement in many cases.

### Learning alliance outcomes – from forming to performing?

By the fourth year, city stakeholders were able to identify the benefits of engagement. Some SWITCH city learning alliances had progressed from the formation stage through the operation stage (offering the opportunity for partners to explore differences, learn from each other and influence each other's perceptions), to the outcome stage (Das and Kumar, 2007). Interviews conducted in early 2009, illustrate how interaction between learning alliance members had broken through institutional and sectorial barriers.

One researcher from Beijing said: "Stakeholders are interacting with others they had not known before SWITCH. They speak to each other, because they now know each other and know what the other is doing." The facilitator in Belo Horizonte saw the same development in her city: "Learning alliance members meet now without formal invitation letters. They invite other learning alliance members to their meetings."

Interaction has led to changes in perception. From Tel Aviv came the comment: "As a result of their engagement in the city alliance, decision makers now see water not as a given, but as a strategic issue." A researcher from Belo Horizonte described how before the project water issues were just about piped water: "[SWITCH] made a big difference and I am very sure about this. The

impact was awareness and advocacy, relating to stormwater and also climate change." The facilitator from Birmingham observed how the SWITCH concepts flowed through their learning alliance: "One of the learning alliance members called to request more information on SUDs. Another learning alliance member spoke spontaneously about SWITCH concepts, talking SWITCH language like 'the need to work together, integrated approach, moving beyond end-of-pipe solutions' and talking about the learning alliance at another meeting I attended."

There was also evidence of stakeholder influence and participation in the shaping of products being developed by project researchers. Project management team members interviewed in 2009 felt that in the cities there had been some changes in the way that research was being done. Other early outcomes from the learning alliance and related activities were captured in internal 'City assessments' in 2010 and in presentations at the final scientific conference in Lodz in October 2010.

Two Lodz city planning officers were particularly enthusiastic about bringing research based findings into use in decision making: "Before, we had our perspective and our way of doing things. We still have our perspective, but now we have a different viewpoint on planning in the city. We can bring these views to our boss who is involved in decision making. We don't use the language of the researchers but put the message into a language that he can understand. We write briefs for him and he is able to use these to influence decisions."

Just as planning decisions can be informed by research, so can research be informed by the needs of planners and those delivering services. The decision support tool known as City Water, has been developed within SWITCH with an emphasis on how it can be used in practice and input from several cities. Because of this involvement, what has been produced is a scoping tool that allows a range of scenarios and alternatives to be considered, rather than a detailed simulation model. One of the management team commented that it is painful for researchers "having a person breathing down your neck asking about the relevance of your research to policy and practice." But it was effective in preventing scientists from working in silos. Indeed, SWITCH researchers involved in Birmingham's learning alliance have emphasised the need for more stakeholder engagement in relation to the introduction of SUDs in England and Wales (Revitt and Ellis, 2010).

The production of strategic documents to set out a future direction for water management in some participating cities has been significant. Comments from the host city at the Lodz meeting in 2010, indicated the impact of Lodz's learning alliance and the pride of those associated with it. A water company representative from Lodz said: "If not for this project, a lot of sewerage would be taken to the rivers and water drained into the soil. Investments improve standard of living – former factory owners did not all consider clean water for their employees. The new river is now beautiful, this is now SWITCH for me." A water engineer described how these benefits are recognised outside the city: "New people come to the city to ask questions about how the city is developing. The inhabitants talk more about water – water as a treasure and the different types of water we have."

Other cities have also seen an increased understanding in the value of research as an aid to decision making. Birmingham devised a demonstration project using green roofs to prevent flooding and pollution. At the end of the project, a City Environment Agency officer was looking forward to the results: "I don't know when the reports will be available but hopefully they will give me an idea of whether you need a green roof policy. For example, if we can say [to a

developer] you are planning 14 floors, we will give you 15 if you have a green roof – then everyone wins. We will need to have better data to answer the questions about green roofs, like ‘Does it prevent flooding?’ ‘How much water does it hold up?’ ‘Does it really clean up water?’”

These are examples of early outcomes. Given the long-term nature of the urban water management change agenda, the more significant outcome will be the level of commitment by learning alliance partners to continue to wrestle with intractable problems although SWITCH has now ended.

One example was given by the water company representative from Lodz who pointed to the need to resolve conflicts of interest, such as the demand to conserve water, set against the need for service providers to cover costs: “We have more capacity than we actually need and this results in lower income for the company due to decline of industry. My staff...have to manage important information on conflicts of interest. We need to remove water from the city when the city is flooded, give permits for collection but ensure that the water is contained for as long as possible. It will take time to manage this conflict of interest.”

Being able to stay in for the long haul is likely to depend on the extent to which partners have started to depend on each other. According to Das and Kumar (2007): “During the outcome stage of the alliance, the greater the degree of interdependence between the partner firms, the greater will be the degree of commitment of the partners to the alliance.”

The benefits of success extend beyond urban water issues. One researcher from Lima noted: “The government of Lima is very interested in applying this multi-stakeholder approach to other areas of policy development.”

### **Effort that is persistent and unusually demanding?**

Can this level of persistent engagement be achieved? In an early stage of the project, one researcher commented: “Existing cities are difficult to change - SWITCH is about cities of the future. We should focus on building new cities so that innovations can be more effective from the beginning.” Another researcher was simply not interested in the learning alliance approach: “I prefer to do my research and let other people give training to the stakeholders.” A third researcher seemed to resent the idea that researchers should work to someone else’s agenda: “To be innovative, the technologies should be leading. Now it’s more like the tail wagging the dog.”

However, towards the end of the project many researchers developed a quite different attitude. A younger researcher based in Lodz reflected that it took a lot of perseverance to get data: “At first, people wanted us to pay for the data and we needed to convince them that it was a good thing and they should cooperate. This attitude is difficult to change. Also, we have to tell stakeholders to wait until we can show them a better way, while the plans for city development are already being developed.”

A city stakeholder from Accra explained how stakeholders cannot expect a learning alliance to provide a quick fix and have to commit to a longer time frame: “I attended the first learning alliance meeting and have been to at least 10 meetings since then. My involvement has changed. Things started at a slow pace and as the learning alliance became known and accepted there has been a move forward, the momentum gets faster and there is improvement in the meetings and maturity as well in the way the meetings are conducted and the way they

do things... when I see them putting in this effort then it makes me want to do my best.” This account not only evidences persistence of effort, but also suggests that a well-managed learning alliance process helps to encourage stakeholder commitment. A city stakeholder from Birmingham agreed that multi-stakeholder processes require time and effort: “At first the municipality was not interested in SWITCH. It took a lot of time and hard work to convince them... We need a lot of time to communicate and come to [a] consensus, it doesn’t happen that fast, things progress during meetings[but] not everything is solved in a day.”

Building consensus between stakeholders requires persistent effort to understand different perspectives and to solve problems together. One stakeholder felt that this was the point of the learning alliance: “The Hamburg learning alliance is a platform to share information and work towards water sensitive urban design. It should raise awareness on different interests and bring these interests together and try to find solutions.”

Rather than differences driving stakeholders apart, the process of resolving differences seemed to be an essential part of cementing the learning alliances and achieving change within the cities. As one Lodz stakeholder said: “Every stakeholder speaks of their interest and from that we find the common interest for everybody.”

## Challenges, lessons and conclusions

The SWITCH experience has highlighted challenges if the learning alliance approach is to be incorporated within the urban water governance process. Lessons from these may help future initiatives, although given the importance of local context, different challenges may also emerge in the future.

**Effective facilitation:** The SWITCH experience suggests that having an effective facilitator (or team of facilitators) is key to a successful learning alliance; a skilled and committed person(s) who can put in significant amounts of time and earn the respect of the main stakeholders.

Setting up a city learning alliance requires not only a person or people with good facilitation skills, but also financial and other support, particularly from influential stakeholders. In the SWITCH project, senior researchers bearing the title ‘city coordinators’ were influential in terms of their gravitas and their control of parts of the project budget. There were variations between cities in the amount of staff time and budgets allocated to support learning alliance facilitators, and this impacted on the way that the city learning alliances operated and developed. In many cities learning alliance facilitators undertook this task alongside other duties, with limited support. Facilitators were more effective when they had the experience, local standing, and quality time to devote to this task.

**Drive/Champions:** The need for drive by individuals often referred to as champions who provided sustained leadership for a particular cause, is recognised as a key element for effective multi-stakeholder processes. Research in the UK indicates that local champions, like learning alliance facilitators, require support and training (Institute for Voluntary Action Research,

2009). The SWITCH project did not explicitly set out to identify or support local champions and strong champions did not exist in all participating cities from the start. However, it is apparent that where more progress has been made in engaging with stakeholders, SWITCH worked through local champions, in most cases locally respected researchers with an academic record and existing relationships with city stakeholders. In a few cities the learning alliance facilitators have become local champions in their own right, helping to sustain the momentum of the learning alliance. Members of the project's management team have taken on an international role and involved city stakeholders in international events to champion the cause of IUWM and raise the international profile of the project. As part of the project design, future initiatives might give attention to mechanisms to identify and support local champions.

Getting researchers on board: One of the main drivers behind the learning alliance concept was the limited uptake of research and the need to get existing water management research into use. The potential divide between researchers and other stakeholders was a challenge within SWITCH. In the fourth year of the project, one researcher commented: "I feel my outputs are not requested", while a learning alliance facilitator said: "We are here to help disseminate research, but we don't know what's out there. Are the researchers in the work packages thinking of the research users?"

There are often limited incentives for researchers to engage in longer term action-research initiatives. Younger researchers on short-term contracts are looking for their next job before the research project ends, and have few incentives to develop long-term relations with city stakeholders. More experienced researchers usually require publication, rather than engagement in action-research, for career progression.

The researchers interviewed at the final SWITCH conference who had engaged more effectively with city stakeholders fell mainly into three categories:

1. Older, more senior researchers with significant previous engineering consulting experience, who had signed up to the vision of integrated urban water management.
2. Mid-career researchers with established positions who felt passionate about the application of their research or were already involved in consultancy and research networking activities.
3. Younger, early-career researchers committed to undertaking research with stakeholders.

Where the SWITCH project was successful in the applying research, was largely by building on previous work by committed and visionary researchers who were not afraid to step away from academic publication to adopt more direct influencing, advisory and facilitation roles. This suggests that getting researchers on board depended to a large extent on selecting the right type of research partners both at individual and organisational level. However, as a result of involvement in a project like SWITCH, some researchers who did not fit the profiles outlined above were also won over to an action-research approach.

**Developing trust and mutual respect:** The SWITCH experience highlights the key importance of building trust and mutual respect between stakeholders of all kinds. In some participating cities, learning alliance meetings developed into a platform where researchers and other stakeholders were comfortable to meet and freely exchange ideas. In Lodz, all parties came to value the learning alliance meetings, and these also played an important role in moving the urban water agenda forward in Accra, Alexandria, Belo Horizonte, Birmingham, Cali, Hamburg, Lima and Tel Aviv. Development of trust and respect has been a gradual process in most cities, resulting in fairly frequent meetings being underpinned by interactions between meetings.

This proved difficult to achieve in Beijing, largely owing to cultural etiquette and existing informal and bilateral mechanisms for achieving innovation and consensus. While trust and mutual respect are key elements for an effective process, the ways of developing this may vary from one city to the next.

Building trust between stakeholders is often a slow and complex process: "like chipping away at a great boulder" as one learning alliance facilitator put it. Nevertheless the SWITCH experience in many of the participating cities and also in Australian cities (Brown and Farrelly, 2009; Brown, 2008) suggests that, where researchers have a strong input, multi-stakeholder platforms do have a future in urban water governance.

**Understanding and working with power relations:** It was important to understand power relations within participating cities and within the project research consortium, and how they impacted on city learning alliances. For example, if a learning alliance is to achieve meaningful influence on the direction of urban water management, it must achieve legitimacy as a platform so that there is continuity in which stakeholders participate. This includes getting high level officials and people from key organisations to attend meetings and endorse the learning alliance.

One of the SWITCH research deliverables was an innovative and comprehensive mapping of water governance arrangements in the UK, using Birmingham as a case study (Green *et al.*, 2007). Each city also undertook a stakeholder analysis as part of the preparation for setting up the city learning alliances. Guidance was provided (Verhagen, 2007) and at a later stage a diagnostic methodology was also made available. However, limited social science involvement meant that cities did not achieve an explicit in-depth analysis of power relations, and how these might influence the dynamics of city learning alliances and inform the stakeholder engagement strategy. Where research coordinators and learning alliance facilitators had local insight into the nature of power relationships, this helped to guide their strategy for engaging with various stakeholders.

The politicisation of urban water issues in cities (Mazungu and Mabiza, 2004; Whitfield, 2006) was an aspect of power relations that does not appear to have been factored into the thinking behind SWITCH city learning alliances. The importance of undertaking an analysis of local context, including the history of water management in each city, was highlighted by external reviewers towards the end of the project.

Equally important to the development of city learning alliances, were the power dynamics within the project consortium itself. The ongoing challenge of getting city learning alliances adequately funded was largely a function of project power and resources within the hands of a small number of research institutions and researchers. Moreover, within each city the effectiveness of the learning alliance facilitator depended to some extent on the level of support received from the city research coordinator.

In similar future initiatives, a more thorough situation analysis incorporating the power dimension would be a useful part of the project inception, as would an analysis of how internal dynamics within a project team can influence the development of learning alliances.

Institutional barriers are difficult to tackle. Engaging with various levels of governance within a city, and between the city and other levels, was a challenge in most cities and a potential

barrier to future technical and institutional innovation. In Lodz and Belo Horizonte, the importance of links to regional bodies was recognised, but it proved difficult within the project timeframe to achieve meaningful engagement. In Birmingham, bringing national-level decision makers on board also proved a challenge. In Tel Aviv, research and strategic planning are separate processes and the municipality only became involved towards the later stages. The main lesson, in the context of project design, is that addressing several levels of governance through a global project like SWITCH was very ambitious.

**Language, cultural and capacity differences:** SWITCH cities functioned in eight major languages and 11 national cultures. The importance of differences in language, culture and its impact on two-way communication in developing strategic partnerships and alliances (Ghosh, 2004) was underestimated in the project design.

Within the project consortium, English was the agreed language for communication, but researchers spoke and wrote in different languages. In cities, the main communication between researchers and stakeholders was in the national language; researchers who did not speak the local language were at a disadvantage just as stakeholders with poor English were disadvantaged in terms of sharing experiences between cities. The involvement of members of the public, urban farmers or junior technical staff in learning alliances was affected by differences of status and vocabulary. Such stakeholders may lack the skills and confidence to get involved. Projects like SWITCH would benefit from more resources and flexibility to enable capacity building of local stakeholders to engage as partners in participatory action research.

National cultures proved significant in terms of understanding the mechanisms for supporting innovation. In the Chinese cities of Beijing and Chongqing, efforts to initiate city learning alliances did not develop as planned. Instead university based project partners played an ‘honest broker’ role to bring together stakeholders in more informal bilateral meetings. This modification was in response to previous experiences with multi-stakeholder platforms in the cities and the public meetings which reflected significant differences between the Western culture of SWITCH thinking and ways of doing business in China. Preparation for a city learning alliance could incorporate an analysis of how innovation has been taking place and the implications for a multi-stakeholder processes.

**Partner choice:** Choice of the “right” partners in a multi-stakeholder process is important, but what does this mean? Studies of public-private sector partnerships have documented success in cases where choices between alternative partners could be made (Le Ber and Branzei, 2010). However, the concept of partner choice is less easy to apply to urban water management. Choices are possible in terms of selecting research institutions and potential cities for action research on water management. However, once cities have been selected, most partners are key stakeholder organisations with a monopoly of a particular water management function. The choice lies in identifying individuals and activities to engage with and in what order. The project recommended use of stakeholder analysis, process planning and facilitation. Further research could be done into how learning alliance facilitators used stakeholder analysis and the training they received in facilitation and process documentation, to steer the learning alliance process.

**Sustaining learning alliances:** While nearly all the project partners acknowledged the value of city learning alliances, they also questioned how these could be sustained. “How to keep people interested and motivated?” was a question posed by one facilitator. Developing productive

stakeholder participation is a challenging task which requires skilled facilitation, particularly if there is lack of trust or unequal power relations. Facilitation is needed to balance the interests of learning alliance members, share information and have open discussions. This, like any other skill, will need to be paid for if city learning alliances are to continue beyond the end of the project.

Conclusion

This chapter outlines the design and conceptualisation of the learning alliance approach at the start of the project and the formation and operation of city learning alliances in the context of decision-making processes related to urban water management. Key elements of an effective multi-stakeholder action research process provided a framework for the analysis of view-points of the three main actor categories: project researchers; city stakeholders and learning alliances facilitators. It transpires that many stakeholders accept the learning alliance concept in the search for technical innovation, and see the potential for learning alliances to engage with water governance issues.

During the formation stage, many project stakeholders were open-minded, some were optimistic, and some were sceptical about what learning alliances could achieve. As the learning alliances moved from formation to operation, facilitators faced the challenge of sustaining a multi-stakeholder process. Project management did not initially work to establish city learning alliances, but as the project progressed it became increasingly supportive of the idea and continued to provide resources to support learning alliances - seeing their potential as platforms for longer-term strategic planning around urban water issues and for uptake and up-scaling of research products.

A number of city stakeholders moved from a sceptical to a supportive position, valuing the city learning alliances as a safe and useful platform for exchanging information, networking, forging relationships and for gaining access to new knowledge relevant to water management. There remain differences of opinion as to whether or not, and to what extent, learning alliances should have a decision making role within cities. In the context of governance, the question of who participates in the learning alliance is important. If participants have recognised authority and influence in a city, there is greater potential to influence changes and innovation in the way that urban water is managed.

Acronyms used in this chapter

EU	European Union
IUWM	Integrated urban water management]
NGO	Non-governmental organisation
UNESCO	United Nations Educational Scientific and Cultural Organization
SUDS	Sustainable urban drainage systems (SUDS)



# References

Brown, R., 2008. Local Institutional Development and Organizational Change for Advancing Sustainable Urban Water Futures. *Environmental Management*, 41, pp. 221-233.

Brown, R.R. & Farrelly, M. A., 2009. Delivering sustainable urban water management: a review of the hurdles we face. *Water Science and Technology*, 59(5), pp. 839-846.

Butterworth, J. & Morris, M., 2007. *Developing processes for delivering demand led research in urban water management*. (SWITCH working paper) [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_PAP\\_Developing\\_processes\\_for\\_demand\\_led\\_research\\_in\\_UWM.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_PAP_Developing_processes_for_demand_led_research_in_UWM.pdf) [Accessed 15 February 2011].

Butterworth, J. & da Silva Wells, C., 2008. *A framework for monitoring and evaluation of project outcomes*. (SWITCH Learning Alliance Briefing Note 7) [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_7\\_M\\_and\\_E.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_7_M_and_E.pdf) [Accessed 15 February 2011].

Castro, J.E., 2004. Urban water and the politics of citizenship: the case of the Mexico City Metropolitan Area (1980s-1990s). *Environment and Planning*, 36, pp. 327- 346.

Contu, A. & Willmott, H., 2003. Re-Embedding Situatedness: The Importance of Power Relations in Learning Theory. *Organization Science* 2003, 14, pp. 283-296.

Das, T.K. & Kumar, R., 2007. Learning dynamics in the alliance development process. *Management Decision*, 45 (4), pp. 684-70.

Friend, J. & Hickling, A., 2005. *Planning Under Pressure: The Strategic Choice Approach*. 3rd ed. Oxford: Elsevier Architectural Press.

Ghosh, A., 2004. Learning in Strategic Alliances, A Vygotskian perspective. *The Learning Organization*, 11 (4/5), pp. 302-311.

Green, C., Johnson, C. and Parker, D., 2007. Institutional arrangements and mapping for the governance of sustainable urban water management technologies: Mapping protocol and case study of Birmingham, England University of Middlesex Flood Hazards Research Centre, SWITCH Report.

Howe, C. & van der Steen, P., 2008. *SWITCH A Systems Approach to Urban Water Management*. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/GEN\\_GEN\\_PAP\\_SWITCH-SystemsApproachUWM-INCOSEJune08.pdf](http://www.switchurbanwater.eu/outputs/pdfs/GEN_GEN_PAP_SWITCH-SystemsApproachUWM-INCOSEJune08.pdf) [Accessed 15 February 2011].

Institute for Voluntary Action Research, 2009. *They are the Champions: the role and impact of local champions*. [Online] Available at: [http://www.thecompact.org.uk/files/139883/FileName/cc\\_research\\_FINALwebversion.pdf](http://www.thecompact.org.uk/files/139883/FileName/cc_research_FINALwebversion.pdf) [Accessed 15 February 2011].

Ison, R., Roling, N. & Watson, D., 2007. Challenges to science and society in the sustainable management and use of water: investigating the role of social learning. *Environmental Science & Policy*, 10, pp. 499 – 511.

Kain, J.H. & Söderberg, H., 2008. Management of Complex Knowledge. In: *Planning for Sustainable Urban Development International Conference for Integrating Urban Knowledge & Practice*. Gothenburg, Sweden 29 May-3 June 2005.

Le Ber, M.J. & Branzei, O., 2010. (Re)Forming Strategic Cross-Sector Partnerships: Relational Process of Social Innovation. *Business and Society*, 49, pp. 140-171.

Lobina, E. Galvis, A. Bernal, D.P. & Visscher J.T., 2008. SWITCH City facilitated progress analysis: Cali. SWITCH working paper.

Lomas, J., 2000. *Connecting Research and Policy*. [Online] Available at: [http://portals.wi.wur.nl/files/docs/ppme/lomas\\_e.pdf](http://portals.wi.wur.nl/files/docs/ppme/lomas_e.pdf) [Accessed 15 February 2011].

Manzungu, E. & Mabiza, C., 2004. Status of water governance in urban areas in Zimbabwe: some preliminary observations from the city of Harare. *Physics and Chemistry of the Earth*, 29, pp. 1167-1172.

Morris, M., 2006. *An Introduction to Learning Alliances* (Learning Alliance Briefing Note 1). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_1\\_Intro\\_to\\_LAs.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_1_Intro_to_LAs.pdf) [Accessed 15 February 2011].

Moriarty, P., Fonseca, C., Smits, S. & Schouten, T., 2005. *Learning Alliances for Scaling Up Innovation Approaches in the Water and Sanitation Sector* (Paper to ESRC Seminar on Water Governance – Challenges and the Consensus, 27-28 July, The Hague). [Online] Available at: <http://splash.bradford.ac.uk/files/PDF%20Moriarty,%20Fonseca,%20Smits%20and%20Schouten%20seminar%203%20paper.pdf> [Accessed 15 February 2011].

Moriarty, P., 2007. Learning Alliance Briefing Note 4: A brief introduction to action research concepts and practice. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_4\\_Action\\_research.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_4_Action_research.pdf) [Accessed 15 February 2011].

Moriarty, P., Batchelor, C., Laban, P. & Fahmy, H., 2007. *The EMPOWERS approach to water governance: background to guidelines and key concepts*. [Online] Available at: <http://www.project.empowers.info/page/3337> [Accessed 15 February 2011].

Moriarty, P., Batchelor, C., Abd-Alhadi, F.T., Laban, P. & Fahmy, H., 2007. *The EMPOWERS approach to water governance: guidelines, methods and tools*. [Online] Available at: <http://www.project.empowers.info/page/3344> [Accessed 15 February 2011].

Nelson, V., Martin, A. & Casella, D., 2008. *An Introduction to Social Inclusion (Draft)* (Learning Alliance Briefing Note 10). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_10\\_Introduction\\_to\\_social\\_inclusion\\_draft.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_10_Introduction_to_social_inclusion_draft.pdf) [Accessed 15 February 2011].

Pahl-Wostl, C. & Hare, M., 2004. Processes of Social Learning in Integrated Resources Management. *Journal of Community & Applied Social Psychology*, 14, pp. 193-206 .

Pearson, L.J., Coggan, A., Proctor, W. & Smith, T.F., 2010. A Sustainable Decision Support Framework for Urban Water Management.

*Water Resource Manage*, 24, pp. 363-376.

Penning de Vries, F.W. T., 2007. Learning Alliances for the broad implementation of an integrated approach to multiple sources, multiple uses and multiple users of water. *Water Resource Manage*, 21, pp. 79-95.

Revi, A. *et al.*, 2006. Goa 2100: The transition to a Sustainable Urban Design. *Environment & Urbanization*, 51, (18(1)), pp. 51-65.

Revitt, M. & Ellis, B., 2010. The management of urban surface water draining in England and Wales. *Water and Environment Journal*, 24, pp. 1-10.

Rogers, P. & Hall, A., 2003. *Effective Water Governance*. Stockholm: Elanders Novum.

Salgadoa, P.P. *et al.*, 2008. Participative multi-criteria analysis for the evaluation of water governance alternatives. A case in the Costa del Sol (Málaga). *Ecological Economics*, 68, pp. 990-1005.

da Silva Wells, C., 2007. *A review of our own thinking on learning alliances*. (SWITCH Learning Alliance Briefing Note No. 3). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_3\\_learning\\_alliance\\_thinking\\_revisited.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_3_learning_alliance_thinking_revisited.pdf) [Accessed 15 February 2011].

da Silva Wells, C. Sutherland, A. & Green, C., 2008. *Institutional Mapping* (Learning Alliance Briefing Note 15) [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_Institutional\\_mapping.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_Institutional_mapping.pdf) [Accessed 15 February 2011].

da Silva Wells, C. Sutherland, A. & Green, C., 2008. *Water governance for integrated urban water management* (Learning Alliance Briefing Note 14) [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_14\\_Governance.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_14_Governance.pdf) [Accessed 15 February 2011].

Semadeni-Davies, A., Hernebring, C., Svensson, G., and Gustafsson, L. G., 2008. The impacts of climate change and urbanisation on drainage in Helsingborg, Sweden: Combined sewer system. *Journal Of Hydrology*, 350 (1-2), 100-113.

Sijbesma, C. & Postma, L., 2008. Quantification of qualitative data in the water sector: the challenges. *Water International*, 33(2), pp. 1-12.

Smits, S., Moriarty, P. & Sijbesma, C. eds., 2007. *Learning alliances: scaling up innovations in water, sanitation and hygiene* (Technical paper series No. 47). Delft, The Netherlands: IRC International Water and Sanitation Centre.

Smits, S. *et al.*, 2009. Mapping governance of urban environmental sanitation in Latin America: case studies from Belo Horizonte, Cali, Lima and Tegucigalpa. [Online] Available at: [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP6-1\\_DEL\\_Mapping\\_governance\\_Latin\\_America.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP6-1_DEL_Mapping_governance_Latin_America.pdf) [Accessed 15 February 2011].

Smits, S., da Silva Wells, C. & Evans, A., 2009. *Strengthening capacities for planning of sanitation and wastewater use: experiences from two cities in Bangladesh and Sri Lanka* (Occasional paper series/ IRC; no. 44). The Hague, The Netherlands: IRC International Water and Sanitation Centre. [Online] Available at: <http://www.irc.nl/page/51911> [Accessed 15 February 2011].

Steyaert, P. & Jiggins, J., 2007. Governance of complex environmental situations through social learning: a synthesis of SLIM's lessons for research, policy and practice. *Environmental Science & Policy*, 10, pp. 575-586.

Sutherland, A. & Darteh, B., 2008. *Revisiting SWITCH consortium thinking on learning alliances* (SWITCH Learning Alliance Briefing No. 8). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_8\\_Revisiting\\_Consortium\\_thinking.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_8_Revisiting_Consortium_thinking.pdf) [Accessed 15 February 2011].

Verhagen, J., 2007. *Stakeholder Analysis* (SWITCH Learning Alliance Briefing Note 2). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_2\\_Stakeholder\\_analysis.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_2_Stakeholder_analysis.pdf) [Accessed 15 February 2011].

Verhagen, J., Butterworth, J. & Morris, M., 2008. Learning alliances for integrated and sustainable innovations in urban water management. *Waterlines*, 27, pp. 2-116.

Wagner, I., da Silva Wells, C., Butterworth, J. & Dziegielewska-Geitz, M., 2009. Reflection on the achievements and lessons from the SWITCH urban water management initiative in Lodz, Poland. [Online] Available at: <http://www.irc.nl/page/61360> [Accessed 15 February 2011].

Whitfield, L., 2006. The Politics of Urban Water Reform in Ghana. *Review of African Political Economy*, 109, pp. 425-448.



part 2  
City case  
studies

## 2.1

Stakeholder discussions at a SWITCH demonstration site. (Photo credit: IPES)

Peru



SOUTH AMERICA



# The potential for treated wastewater use in Lima

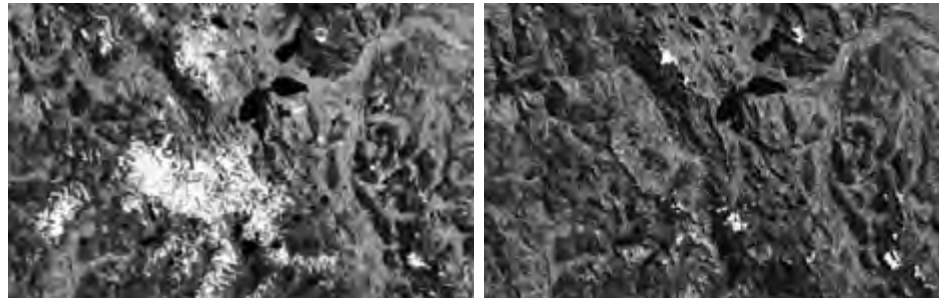
By Cecilia Castro, Gunther Merzthal and René van Veenhuizen

## Introduction

Spanish conquistador Francisco Pizarro founded the City of Lima as the 'City of Kings' in 1535 on the banks of the river Rímac, chosen for its water, fertile soils and good climate. Today the capital of Peru sprawls from the Rímac, Chillón and Lurín rivers into the dry regions beyond making it, after Cairo, the second largest city in the world built on desert.

Urbanisation is intense. In 2007, Lima and Callao, the port city with which Lima has effectively merged, were home to 8.5 million residents, more than a quarter of the population of Peru (INEI, 2008), making the fifth largest city in Latin America. It is expected that by 2050 the city will double in size to 16 million people. Average consumption of water per inhabitant is 150 litres per day.

Since annual rainfall is almost non-existent at around 13 mm a year, Metropolitan Lima and Callao city get their water from surface and underground sources. There is also high dependence on the Andes glaciers which feed water to Lima through tunnels in the mountain. Global warming endangers small and medium glaciers more than 5,500 metres above sea level, and in the long run this buffer will become completely depleted. Figure 2.1.1 shows how Santa Eulalia glacier (one of the glaciers that provide water for Lima and Callao) has melted away in five years.

**Figure 2.1.1 Glacial melt process of Santa Eulalia glacier (1999-2004)**

Source: SEDAPAL (2008)

Around 75% of available water is used for human consumption, 22% by agriculture in peri-urban and urban areas and the rest (3%) on green spaces and for industrial and mining activities (Moscoso & Alfaro, 2008).

The sewerage system collects 17.5 m<sup>3</sup>/s of wastewater from 85.4% of Lima's population. The rest flows into the sea. From the total amount of wastewater collected in the city only 15% is treated (Moscoso, 2010). Most wastewater is discharged without treatment into the sea or rivers, generating polluting ecological systems and affecting fishery resources.

### Productive use of water and wastewater

Owing to the scarcity of rain and the pressure on the water supply, green spaces, agriculture and commercial enterprises around the cities use piped water, raw wastewater, treated wastewater or river water. Use of piped water is not permitted for irrigation but it does happen.

Agriculture in urban areas in Lima has increased in the last decade as a strategy to increase access to food (vegetables), to generate income and improve the environment. It is supported by the agricultural customs and traditions of the new inhabitants who moved to the city from rural areas of Peru.

The low rainfall and low availability of water results in unmet demand for water so that Lima has only half the area of green spaces recommended by UN experts. However, there is potential to reuse water for this purpose. Less than 15% (210 hectares) of parks and gardens in the city are irrigated with treated wastewater. The rest is irrigated with polluted river water or by piped drinking water (Moscoso and Alfaro, 2008).

The potential for using treated wastewater for productive uses has generated interest as national and municipal authorities try to limit piped water use for consumption only, and to monitor and increase the quality of water used for irrigation of crops in peri-urban areas and green spaces in urban areas.

In March 2009, the Peruvian government enacted The Regulation of the Water Resources Act, which gives the National Water Authority (ANA) a mandate to authorise the use of treated wastewater, so long as it has an environmental certification granted by the competent environmental authority in the relevant sector.

## SWITCH in Lima

### Project origins and objectives

The SWITCH project developed in Lima in 2006 while these issues were still under discussion and before some of the key bodies had been created. The main focus for SWITCH was the use of wastewater for productive use in the city. The coordinating partner was IPES Promocion del Desarrollo Sostenible, which worked on SWITCH in close collaboration with the Office of Environment (OMA) of the Ministry of Housing, Construction and Sanitation (MVCS), and with ETC Foundation. SWITCH built upon a number of earlier efforts related to reuse of treated wastewater. An important lesson from these was that it was difficult to achieve so long as the legislative and regulatory framework did not promote this approach and in the absence of a supportive institutional setting.

This situation required SWITCH, not only to start research and demonstration activities in Lima, but also to lobby at national level to promote the development of a national regulatory framework and the use of treated wastewater in Peru.

The proposal for SWITCH to intervene in Peru was agreed in 2005 under the former national government, with participation from other local authorities. In 2006, a new government launched an ambitious programme of '*Agua para todos*' (Water for All), to be implemented by MVCS. It was in this context that the SWITCH programme started.

In 2006 to identify constraints and opportunities, IPES interviewed key people and reviewed secondary data on the use of treated wastewater in urban agricultural irrigation, green spaces and forestry. This analysis confirmed that one of the main limitations for the low use of treated wastewater was lack of legislation and policy to promote it.

IPES conducted an analysis of the competencies and functions of the MVCS, the governmental body responsible for the sanitation subsector, to see if it could act as the strategic partner in SWITCH Lima. The Office of Environment (OMA) was identified as the body within the Ministry that seeks to consolidate and strengthen environmental management towards sustainable development. MVCS/OMA and IPES signed an agreement to implement the project jointly.

IPES and MVCS/OMA agreed that their main objective would be the formulation and approval of policy guidelines for the sanitation sector to promote the reuse of treated wastewater. They set out to identify gaps in the existing regulatory framework, looking at the technical, institutional, economic, environmental, health and socio cultural aspects of reuse.

The aim was to produce a set of guidelines that would cover regulatory gaps and set a national and municipal agenda for the improved management of treated wastewater for productive use in urban areas, as well as improving access to and recycling of water resources in Lima.

<sup>1</sup>IPES seeks to improve food security and nutrition, generate decent jobs and fair incomes, provide access to good quality basic services and create a healthy environment in Latin America and the Caribbean. IPES has 25 years of experience, with an emphasis on disadvantaged people in intermediate cities.

### Intervention logic

The intervention logic of SWITCH Lima was that access to and use of treated wastewater could be increased on the basis of:

- Research and demonstrations rooted in a local learning alliance to provide evidence that would convince key stakeholders of the problems and safe solutions.
- Development of officially recognised policy guidelines, involving a national learning alliance of key stakeholders, to facilitate scaled-up safe reuse of wastewater.
- Training and communication for stakeholders to participate in this process and for tools (website *etc.*) aimed at improving the awareness of the new policy and the capacities to enhance its implementation.

As detailed below, the learning alliances brought together major stakeholders linked with the treatment and reuse of wastewater in communication and decision-making platforms.

### Locally-based evidence for the development of guidelines

Research to support the development of guidelines began by making an inventory of experiences of treatment and reuse of wastewater in urban and peri-urban Lima and Callao.

The inventory identified 37 experiences of reusing treated wastewater, 20 in peri-urban areas and 17 in urban areas. In half the cases the water was used for green spaces, in more than a third it was used for agriculture and in other cases it was used for a combination of greening, aquaculture and agriculture. A separate inventory of urban agriculture identified 42 experiences, of which only five used treated wastewater for irrigation and 19 used piped water (all of them in urban areas).

The research team also analysed the normative and institutional framework related directly or indirectly to water management with a focus on wastewater. This 2007 report suggested changes in the legal framework and identified the need for capacity development of inter-institutional collaboration. In 2008, two new important government agencies were formed: the National Water Authority and the Ministry of Environment.

To generate more knowledge about the causes and effects of weaknesses in using wastewater for productive use, IPES and MVCS/OMA identified research areas to be covered through local case studies. In all, 12 experiences (six of wastewater reuse and six urban agriculture cases) were studied in more depth. An analysis framework was developed by the research team to assess these studies under five areas of sustainability, taking into consideration both the treatment and the reuse aspects.

The criteria make an acronym FIETS that means bicycle in Dutch:

- financial (economic)
- institutional and legal
- environmental and health
- technical
- social-cultural.

Based on this information, the legal and institutional study proposed to:

- Promote centralised treatment systems (public, private or mixed service providers in sanitation) and decentralised reuse, with municipalities to coordinate the irrigation of green areas and parks and urban producer associations.
- Support the development of privately managed, decentralised treatment and reuse systems.
- Show interested parties the links between treatment and reuse systems.

### Learning alliances of stakeholders for dialogue and exchange of knowledge

IPES and MVCS/OMA designed a learning alliance to enable the formulation of policy guidelines and to coordinate government sectors and civil society. In 2007, IRC and ETC invited those known to be involved in reuse or treatment of wastewater and/or urban agriculture to the launch of the Lima SWITCH project. They included NGOs and foundations, local government bodies, academic and research institutions, farmers' organisations, cooperatives, the private sector and national government departments. Learning alliances were developed at national and local levels to support research activities, involve actors in the process and set a basis for disseminating action-oriented research products (see Boxes 2.1.1, 2.1.2 and Figure 2.2.2).

#### Box 2.1.1 National Learning Alliance

The National Learning Alliance – Peru (NLAP), led by the Ministry of Housing, Building & Sanitation (MVCS), comprised governmental bodies linked to the formulation and approval of policy guidelines for the use of domestic treated wastewater.

- Ministry of Housing, Building & Sanitation (MVCS) – The governing body of the sanitation sector that formulates, approves, implements and monitors the implementation of national policies on water and sanitation. The Ministry's Office of the Environment (OMA) within the ministry assumed the leadership of the SWITCH project within the learning alliance.
- National Superintendency of Sanitation Services (SUNASS) is the regulatory body for the sanitation sector.
- Ministry of the Environment (MINAM) develops, directs, oversees and implements the National Environmental Policy and National Water Resources Plan. Establishes environmental quality standards for treating wastewater for use.
- Ministry of Health /General Directorate of Environmental Health (DIGESA) oversees the health aspects of water for human consumption and environmental protection.
- National Water Authority (ANA), within the Ministry of Agriculture, is responsible for the sustainable use of water resources and river basins in the country.

**Box 2.1.2 Local Learning Alliance**

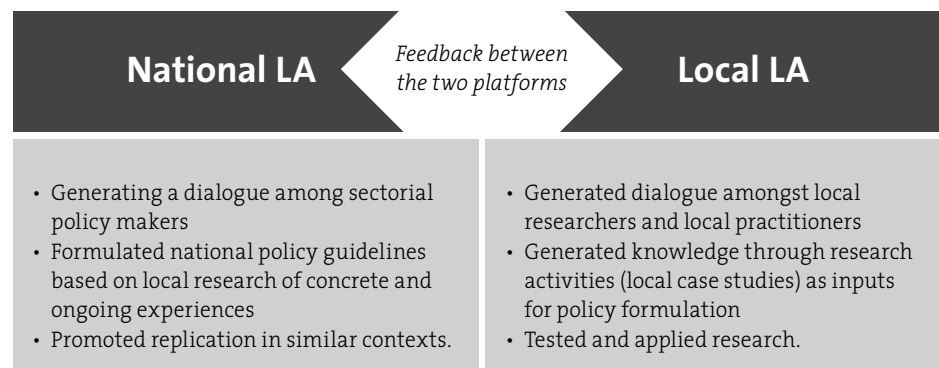
The Local Learning Alliance – Lima (LLAL) integrated local government, the private sector, academic/research institutions and producer organisations with experience of treating or using treated wastewater for irrigation of green, forestry and agricultural areas, and related research or academic institutions.

- Municipalities of Villa El Salvador, Pucusana, Miraflores, Metropolitan Lima, Carabayillo and Comas
- Inmaculada School
- National University of Engineering
- Universidad Nacional Agraria La Molina (UNALM).

Local learning alliance members contributed to identifying constraints and the potential for use of treated wastewater, information that was used in drawing up the National Policy Guidelines. La Molina University (UNALM) became a key partner in implementing the research phase with one professor supporting the inventory compilation and development of the case studies related to urban agriculture.

As facilitator of both platforms, IPES supported exchanges between them by publishing information and organising joint meetings.

Figure 2.2.2 Linked national and local learning alliance platforms



### Demonstration project

A demonstration project was designed and implemented in the district of Villa el Salvador, Lima to validate elements of the policy guidelines and to establish a research and demonstration site as an example of treating and using wastewater for a productive green area (Figure 2.2.3).

The aim was to construct an Eco-Productive Park to show decentralised (re)use of treated wastewater on two hectares of what was fairly typical desert-like area. The project looked to strengthen the practice of urban agriculture for growing food and to make urban green spaces more visible. In practice, it was impossible to grow food because legislation did not permit the use of wastewater for this purpose. However, it did demonstrate a social function (community building, recreation, social inclusion, *etc.*), an economic function (income), and environmental function (green space, improvement of air, reuse of waste, *etc.*).

The Eco-Productive Park was named OGAPU, which in Spanish is an acronym for 'optimising water management to combat urban poverty'. It was designed in a participative way through a series of workshops with the community and community based organisations, architects, and authorities. It has four components: recreation (games for children; chess table); sports (a grass football field; cycle path); production (growing ornamental bushes that are sold to city parks) and a tertiary treatment pond for wastewater.

Figure 2.2.3 Design of the Eco-Productive Park in Villa El Salvador with photos of the park after construction



Three members of the learning alliance: MVCS, IPES and the Municipality of Villa El Salvador, took the lead and created an informal learning alliance at neighbourhood level along with the private enterprise Peruvian Energy Network (REP) and local CBOs.

### Participative formulation of policy guidelines

In November 2010, policy guidelines for the treatment and reuse of wastewater in urban areas were approved through a Ministerial Resolution. Their preparation was a participatory process, under the leadership of MVCS, which included a SWOT analysis, the FIETS analysis and dialogue between stakeholders.



The guidelines identified five main objectives, to:

- Contribute to the national management of water resources by including the reuse of municipal and domestic wastewater for irrigating urban and peri-urban green areas in the national water and sanitation policy.
- Encourage the use of effective and adapted water treatment technologies for reusing domestic and municipal wastewater for irrigating urban and peri-urban green areas, and support the implementation of research that contributes to improving sanitary quality and reducing costs.
- Establish mechanisms that promote the participation of the public and private sector, civil society and international organisations to invest in developing water treatment systems geared toward reusing domestic and municipal water for irrigating urban and peri-urban green areas.
- Promote social participation and public access to information about stakeholders involved in the treatment and reuse of domestic and municipal wastewater in order to ensure transparency, control and efficiency.
- Strengthen the capacities of sanitation service providers, governmental bodies responsible for the sector and users of domestic and municipal treated wastewater.

These guidelines, each with its own linked activities, proposed the development of a national strategy to promote the reuse of domestic and municipal wastewater for green urban and peri-urban areas as a priority. Implementation of the guidelines is being overseen by a multi-sectoral committee, which continues the work of the NLAP and comprises the ministries of Housing, Health, Environment, ANA and SUNASS. Other bodies are co-opted for advice. MVCS was made responsible for preparing a work plan to enable each sector to prioritise activities and to schedule and coordinate pilot projects.

The NLAP prioritised a national training course on treatment and use of wastewater as a key objective. The course was designed for municipal officers and water and sanitation technicians of enterprises managing wastewater treatment systems. It was oriented towards the reuse of treated wastewater in agriculture, forestry and green areas and was intended to strengthen the use of SWITCH project findings, support the implementation of the policy guidelines and promote the scaling up of the recommendations at national level. The training course was conducted by IPES and MVCS/OMA in 2010 with support from other learning alliance members and was jointly financed by SWITCH and the Ministry. It trained 100 representatives of municipal service providers, local and regional governments, producers association, local water authorities and others. Plans were made to repeat this training for the Andean and Amazon cities in Peru.

### **Knowledge management and dissemination of lessons from SWITCH Lima**

All the SWITCH Lima project processes, including research, training and demonstration activities results, are available for learning alliance members through the website [www.ipes.org/au/switch](http://www.ipes.org/au/switch) and were circulated on a CD.

Two publications with results from the research diagnosis and a draft document with the policy guidelines for discussion and validation were disseminated. A video showing the results of the demonstration project was shared through project and Ministry websites. SWITCH results were also shared through the MVCS safe water sub-committee concerned with protecting water resources in Peru.

SWITCH Lima attended the 2010 LatinoSan conference in Brazil on community-led total sanitation and made links with the Network for the Management of Wastewater in Latin America and the Caribbean (REGAR-LAC).

Two activities during the final six months of the project were related to dissemination of findings and capacity building: the national training workshop for strengthening capacities; and a virtual resource centre developed to provide access to publications, accounts of experiences, project reports, research studies and others material related to the treatment and reuse of wastewater systems.

## **Findings and discussion**

SWITCH focused on opportunities to improve access to water for food production, an issue identified in the strategic action plans on urban agriculture that were developed in municipalities. The use of treated wastewater, is not allowed for food crops under current legal arrangements, so the focus was on using treated wastewater for greening parks and gardens. This related well to the priorities of the participating municipalities which anticipated that using treated wastewater for green areas and urban forestry would facilitate more public recreation space and improve the city's landscape, while also leading to other social and environmental benefits.

IPES reached out to key institutes with experience and networks for facilitating and participating in SWITCH Lima and to new institutions from the wastewater reuse and (urban) agriculture sectors. The most important of these was the Ministry of Housing, Construction and Sanitation (MVCS). SWITCH fitted well with the mandate of MVCS and the timing was right, since it allowed joint work on policy guidelines, the strengthening of links with public and private partners and helped MVCS with strategic planning on linking treatment and productive use.

At a later stage, SUNASS, responsible for tariffs/prices of services in water delivery and sanitation, saw SWITCH and the development of policy guidelines as a means of developing prices for treated wastewater and its use, and as an incentive to develop and improve treatment plants.

### **Motivated and experienced facilitation**

For more than 10 years, IPES had built up credibility and experience in facilitation of multi-stakeholder processes related to environment and urban agriculture. When the SWITCH programme started in Lima, IPES developed the methodology for research, training and demonstration, starting with key people from La Molina and MVCS, assisted by IRC and ETC.

IPES participated in all three platforms and facilitated the links and communication between the institutes and the platforms, including process documentation. Facilitating the learning alliance, in terms of meetings, agreements and transparent decision making processes, was a

crucial, albeit demanding, task to assure full participation and inclusion of different members' viewpoints and the institutionalisation of achievements. IPES saw it as part of their mandate to continue participation in and support for the platform beyond the end of the SWITCH project, but it was not clear at the time of publication whether sufficient funding could be secured to do so.

"The input of IPES is valued as tremendously important by the Ministry. Relations with NGOs (and the Ministry) have not been that good in the past, but through SWITCH it is shown that collaboration with NGOs and other institutions was not only possible, but also led to improved results."

*Interview with MVCS*

The selection of MVCS as the main partner and co-facilitator was a key decision, because the Ministry is responsible for policy related to the treatment of wastewater and for the management of parks in Lima. MVCS suggested its own Office of the Environment (OMA) should lead on the formulation of policy guidelines.

"OMA is working on necessary regulations already, such as a maximum level of emissions from wastewater treatment plants when discharging into receiving bodies, like the ocean, lakes, rivers, etc.; and for the reuse of wastewater in agriculture, green areas, aquaculture and reforestation[...] Other projects OMA is working on include the level of discharge into the sewer network (a controversial issue we have been working on for almost two years with CONAM),[...]regulations for solid waste management, an environmental classification system for projects in this sector, and guidelines for the preparation of environmental impact studies and environmental adjustment programmes for water and sanitation activities."

*Ministry of Housing, Construction and Sanitation*

OMA-MHVCS was been a major contributor and facilitator, not only in the development of the guidelines, but also in facilitation of the learning alliance process and in developing appropriate links to other governmental bodies.

### Learning alliances at appropriate levels

The decision to operate a national and a local learning alliance (and later a third informal learning alliance for the demonstration Eco-Productive Park in Villa El Salvador) made it possible for all relevant actors to become part of this process and to share their knowledge and experience.

The strength of this set up was that each level of operation had specific members linked to the task it was to undertake. A group of stakeholders was involved in the development and direct application of the demonstration project. The local learning alliance brought together municipalities and institutions responsible for the coordination, execution, assessment and further dissemination of research, inventories, case studies and lessons from the demonstration project. The NLAP was responsible for developing the national policy guidelines and for national scaling up. This set up worked extremely well, as both formal platforms involved their stakeholders in learning and influencing policy and maintained information flows within and between the learning alliance platforms.

- All major stakeholders were involved from the onset in planning and research.
- Research was put in use and further application was assured.
- Findings were scaled up to national level, leading to training modules being set up.
- The process affected ways of thinking and operating of participants and institutions.

Several institutions mentioned that links with other institutions improved. In some cases links had previously been non-existent since policy development has always been vertical and sectoral in Peru. Improving collaboration is all the more important since water, treatment of wastewater, and productive use for parks, gardens and urban agriculture cover the mandates of several ministries and national agencies. SWITCH facilitated an approach that made intersectoral work possible. Interest in continuing this alliance and these processes elsewhere was evident at the point when SWITCH came to a close.

"SUNASS would be interested in seeking to repeat multi-actor processes in the provinces, building capacities of the major actors."

*Interview with SUNASS*

### Other beneficial results

Other benefits flowed from the SWITCH project:

- Joint analysis and discussion on treatment and wastewater use improved the collective knowledge in institutions about the experience available in Lima and Peru, and led to an agreed approach, as well as the development of the guidelines.
- A lobbying strategy was adopted to raise awareness at the highest levels of decision making in institutions and with members of parliament to discuss possible changes to existing laws and define clear responsibilities.
- SWITCH reports on case studies, information the project generated on technologies, and the typology and framework, are highly appreciated and seen as important instruments by many institutions at national and local level and by the private sector.
- Several innovative methods were adopted to demonstrate existing knowledge and to bring research into use. MVCS began a number of pilots in one park where housing, sanitation, vegetation and aquaculture are all linked to reuse of wastewater. SWITCH experiences were expected to be a useful input.



- The SWITCH demonstration project, OGAPU, acted as a showcase for productive reuse and for decentralised technology. Every municipality/province in Peru has its own municipal service provider responsible for water management, including treatment, but there was no institution responsible for bringing treated water to users or providing guidance on its proper use.
- The demonstration project showed that a multifunctional green area, irrigated with treated wastewater, can meet the needs of the surrounding population and potentially generate income for neighbourhoods. The demonstration enabled validation of the policy guidelines and tested a methodology for adding value to the vacant areas of a city, potentially benefitting the poorest groups of the community.

### Development of guidelines

In early meetings with the Ministry, the lack of legislation and policies on using treated wastewater was identified as a major obstacle. Analysis of the case studies and the legal framework served as main inputs for the elaboration of the first draft of the policy guidelines. The guidelines were reviewed and finalised with members of the NLAP in October 2008 and presented in December 2008 at a special session of the National Conference on Water and Sanitation (PERUSAN). They were formally approved in November 2010 by the Peruvian Government.

The process needed to be flexible as revisions and negotiations took a very long time, partly owing to political changes at decision-making levels of governmental bodies that slowed the process and required the discussion process to restart.

Beyond the life of SWITCH, the policy guidelines will act as a strategic agenda for institutions. The intersectoral committee, led by MVCS began in December 2010 to develop a work plan to implement actions identified in the policy guidelines. One challenge was to broaden the agenda so that other actors (NGOs, academic institutions, water enterprises) could participate.

### Building capacity

Capacity building was important at specific moments throughout the process. For example, it was important for members of the learning alliances to collaborate in multi-stakeholder processes on the actual issues involved in reuse of wastewater and on policy development. At the first training event, actors were enthusiastic, the programme was further developed and the decision was taken to work at both national and municipal/local levels. Capacity building was seen as part of the facilitation of the process, both for the NLAP and for the local team involved in research and demonstration activities. Its continuing importance can be seen in the national training course.

## Conclusions and recommendations

### Conclusions

SWITCH Lima focused on a single major issue that responded to real and urgent needs in the city: the shortage of water. SWITCH Lima researched and presented experiences and developed a knowledge base regarding the sustainability and potential application of alternative sources of water and their potential for productive reuse, technologically and institutionally. The programme influenced policy and facilitated the development of policy guidelines to further develop necessary legislation.

SWITCH widened perspectives and provided the opportunity for various stakeholders to jointly learn and strengthen collaboration.

The project created a better understanding of available treatment and reuse practices, provided an innovative framework of analysis and facilitated a greater understanding of the potential use of these practices. It also brought the major stakeholders together to support the use of treated wastewater through adequate legislation. These contributions were highly valued by stakeholders and the guidelines were approved, and started to be put into practice. To make them easily accessible in Latin America, all documents were published in Spanish, although language barriers hindered sharing experiences with a wider audience outside LAC.

The demonstration project, involving major local and national stakeholders, was chosen to fit a future perspective for a more decentralised approach to collection, treatment and reuse of wastewater. The challenge beyond SWITCH is continuing support for the municipality and its citizens to further develop the demonstration site and take the lessons from it to the organisations responsible for water treatment in every other municipality.

The learning alliance approach allowed for a broad platform and flexibility, involvement of all stakeholders at the right level of intervention and competence and allowed for changes in line with institutional changes. As a spin-off, the MVCS developed links to other public authorities, while trust and interest in further collaboration with NGOs (such as IPES) has been a major outcome.

There is a high degree of appreciation for the SWITCH Lima project, both in terms of the quality of its products, and for the methodology. There was an explicit demand for continuation beyond the end of the project timeline.

### Recommendations

If the work promoted by SWITCH does indeed continue, it is recommended to consider including the broader approach developed by SWITCH in other cities, such as eco-sanitation or the use of wetlands for treatment of wastewater. A separate event on the findings of resource, recovery and reuse was agreed and this was designed to include eco-sanitation and water sources for urban agriculture.

Lessons from Lima, especially the technology assessment FIETS, the development of policy guidelines and the involvement of the learning alliance, have been written up and included in

the SWITCH training package drawn up by Local Governments for Sustainability (ICLEI). The team that reviewed SWITCH in Lima recommended that additional funding should be sought to support MVCS and other members of the NLAP for pilots and for greater involvement of private enterprise to link public and private interests in the provision of water and sanitation services and the issues of adequate payments and service fees.

At the point where SWITCH came to a close in April 2011, legislation in Peru still prohibited the use of treated wastewater on food crops, which meant that the focus for demonstration projects had to remain on parks, gardens and ornamental horticulture. However, the SWITCH review team recommended continuing to develop frameworks and legislation to allow for wider productive reuse, especially opportunities for community and private sector income generation. The longer term aim should be to improve access to food, to alleviate poverty and for effective governance.

- Further institutionalisation of the guidelines could be facilitated by:
- Continuing to coordinate and guide the implementation of the policy guidelines in Lima and other municipalities in Peru, facilitated by MVCS and with input from IPES.
  - Involving and building the capacity of other institutions and persons, especially within the ANA which has responsibility for water management at national level.

Acronyms used in this chapter

ANA	National Water Authority (Autoridad Nacional del Agua)
DIGESA	General Directorate of Environmental Health
FIETS	Financial, Institutional, Environmental, Technical, Social-Cultural
ICLEI	Local Governments for Sustainability
IPES	Promocion del Desarrollo Sostenible
LAC	Latin America and the Caribbean
LLAL	Local Learning Alliance (Lima)
MVCS	Ministry of Housing, Construction and Sanitation
MINAM	Ministry of the Environment
NLAP	National Learning Alliance (Peru)
OGAPU	Optimising Water Management to Combat Urban Poverty
OMA	Office of the Environment (in the MVCS)
PERUSAN	Peruvian Conference on Sanitation
REGAR-LAC	Network for the Management of Wastewater in Latin America and Caribbean
REP	Peruvian Energy Network
SEDAPAL	Enterprise responsible for water and sewerage in LIMA
SUNASS	National Superintendency of Sanitation Services
SWITCH	Sustainable Water Management Improves the Health of the Cities of Tomorrow
SWOT	Strengths, weaknesses, opportunities, threats
UNALM	Universidad Nacional Agraria La Molina

References

Autoridad Nacional del Agua, 2009. *Ley de Recursos Hídricos. Ley n° 29338*. [Online] Available at: [http://www.agrorural.gob.pe/dmdocuments/LeydeRecursosHidricos\\_29338.pdf](http://www.agrorural.gob.pe/dmdocuments/LeydeRecursosHidricos_29338.pdf) [Accessed 17 December 2010].

Instituto Nacional de Estadística e Informática, 2008. Perfil Socioemográfico del Perú. In: *Censos Nacionales 2007: XI de Población y VI de Vivienda*. 2ª edición. Lima: INEI, pp. 29-30.

León, G., 2009. *Gestión Del Recurso Hidrico Para Fortalecer la Oferta y la Demanda*. In: Agua, Saneamiento y Cambio Climático: Desafíos y Propuestas” National seminar 4-6 Nov 2009. Peru.

Moscoso, J. & Alfaro, T., 2008. Panorama de experiencias de tratamiento y uso de aguas residuales en Lima Metropolitana y Callao. *IPES Promoción del Desarrollo Sostenible. Serie Cuadernos de Agricultura Urbana*, 6.

Soto, N. & Siura, S., 2008. Panorama de experiencias de agricultura urbana en Lima Metropolitana y Callao. *IPES Promoción del Desarrollo Sostenible. Serie Cuadernos de Agricultura Urbana*, 5.

Related websites

- National Authority of Water: [www.ana.gob.pe](http://www.ana.gob.pe)
- SUNASS: [www.sunass.gob.pe](http://www.sunass.gob.pe)
- SEDAPAL: [www.sedapal.com.pe](http://www.sedapal.com.pe)
- SWITCH Lima [www.ipes.org/au/switch](http://www.ipes.org/au/switch)
- SWITCH training kit: [www.switchtraining.eu](http://www.switchtraining.eu)

## 2.2

Wastewater discharge into the Cauca River. (Photo credit: Cinara)

Colombia



SOUTH AMERICA

## Cali: city of seven rivers

By Stef Smits, Alberto Galvis, Diana Alexandra Zambrano, Melissa Herrera, Kim Andersson and Diana Paola Bernal

### Introduction

Cali is the third largest city in Colombia and is well supplied with water resources, being known as the 'city of seven rivers'. But the two million inhabitants of this city at the foothills of the Western Andean Cordillera face a range of water management problems. Chief among them is the pollution of all seven rivers, particularly the Cauca. There are many sources of pollution, including domestic wastewater, diffuse pollution from run-off, industrial waste and toxic waste that leaches from a former city waste dump. The situation not only affects water quality in the rivers, it also impacts on the city water supply, where the intake often has to be closed because of pollution.

Urban expansion is planned in two areas adjacent to the city: middle and higher income housing in the Corredor Cali – Jamundí and low-income housing in the Régimen Diferido de Navarro. This expansion could contribute to further contamination. At the same time, it presents an opportunity to develop alternative approaches to water management that are more sustainable. However many people, including the SWITCH team, believe that these areas should not be considered for housing development.

Underlying the water management problems are weaknesses in governance, particularly short-term planning frameworks and lack of collaboration between water management agencies. A 2008 study (Smits *et al.*, 2008) found a high degree of fragmentation in the institutional roles in water and broader environmental management in Cali, with a lack coordination and little integration between the planning of entities involved in water management. Despite a growing recognition of the need to work together, there was insufficient leadership to achieve a common vision, a division between technical and political decision making processes and only limited involvement of civil society.

### Project team and partners

SWITCH in Cali built on a number of past experiences and activities between the Universidad del Valle (Univalle) and city stakeholders. This included research into drinking water treatment and a project to model the Cauca River, which generated insight into the water quality and main sources of pollution. Through these projects, Univalle established close relationships with some of the key stakeholders in water management in Cali and along the Cauca River. In the early 2000s, a series of *mesas de trabajo* (round table meetings) were held with the main agencies to analyse water management problems and develop problem trees, to uncover related problems, causes and effects. Efforts to address these problems had usually been limited to one part of the water cycle or a single stakeholder, and so SWITCH tried to expand these efforts by looking at the cycle in a more integrated way and by working with an alliance of stakeholders. The SWITCH project in Cali began as a case study city, with research in just two areas. Over the following year, the Univalle team, supported by UNESCO-IHE and IRC, developed a proposal to become a fully-fledged SWITCH demonstration city with a learning alliance. This was approved in early 2008.

Univalle was the lead partner for SWITCH in Cali, through Cinara, a research and development institute covering water supply, environmental sanitation and water resources management. Senior researcher Alberto Galvis became City Coordinator, supported by a team of facilitators and by other researchers who worked part-time on the project. The team worked with other staff from Cinara and Univalle and was supported by two SWITCH consortium members from Europe: UNESCO-IHE and IRC. The Univalle/Cinara team was well-balanced in terms of gender. In terms of disciplines both the project team and supporting colleagues had a bias towards engineering.

### Intervention logic and methodology

The project team and learning alliance focused on three problem areas in Cali:

- water quality of the Cauca and its impact on the water supply system
- the southern drainage system
- the feasibility of promoting changes in the development of future urbanisation zones, particularly the Corredor Cali – Jamundí.

Each location encouraged the project to address different aspects of integrated urban water management (IUWM). The impact of water quality problems on drinking water was immediate and stakeholders were easily mobilised around this; the situation in the southern drainage system was complex and required the involvement of multiple stakeholders; the urbanisation zones lent themselves to testing approaches for the future. Learning alliance members decided to treat them as distinct topics.

A long-term vision was defined for each of the three problem areas and these were brought together to build the 2040 vision for water management in Cali (Box 2.2.1). This had no formal status in Cali's administration, but short, medium and long term actions were later elaborated and promoted for inclusion in formal planning spaces. The municipality is now developing its own formal Cali Vision 2036, which covers housing, health and education as well as water.

#### Box 2.2.1 Vision for Cali in 2040

"Cali is a city where all citizens can enjoy a clean and healthy environment, with vital eco-systems and offering extensive green areas in the urban area. The city's water resources are of good quality, maintain sufficient flow to preserve aquatic life, and satisfy a variety of human needs. There is a safe environment for healthy coexistence in an atmosphere of respect and peace, and an environmentally aware culture, where citizens have decent homes in areas with a low risk of natural disaster."

Cali Vision developed by SWITCH

SWITCH Cali used a range of methods to address problem areas. The project team focused on education, research and building the capacity of the learning alliance. Outcomes were used in SWITCH planning processes, which in turn fed into formal planning processes and public policy advocacy. The learning alliance core group also tried to scale up the use of findings and activities through outreach to other stakeholders and other short-term projects.

## Results and discussion

An assessment of SWITCH in Cali was conducted in early 2010 through a review of project documents, a project team reflection meeting and interviews with stakeholders. It showed successes in a number of areas and identified gaps and areas to address in the final year of the project.

### Research: opening perspectives to new alternatives

SWITCH Cali contributed to a scientific understanding of IUWM by sharing insights into the water cycle in Cali and contextualising existing knowledge, especially around wastewater management problems. For example, a comprehensive assessment report (Cinara, 2008) drew together information and data from several institutions and showed that wastewater in the south drainage channel contained heavy metals from small industries in the city. SWITCH also researched the feasibility of applying natural wastewater treatment technologies, and methods of reuse and cleaner production in the Cali context, highlighting both their potential and limitations. Three aspects in particular are said to have contributed to these achievements.

- Action research around concrete problems in the city was seen as having more purpose and efficiency. Diana Zambrano, a researcher from Cinara/Univalle, found that this approach allowed her to contextualise possible technological solutions to the Cali environment – making it *platanizado*, a term used to refer to an outsider who picks up the local patterns of speech. She also found it much easier to obtain data and information once institutions understood why it was needed and how it would be used.
- Cinara/Univalle has a good reputation and is perceived as being objective and unbiased, with the result that results were trusted. Stakeholders valued the care taken to understand advantages and disadvantages of wastewater treatment options, leading to greater transparency and better informed decision making. A lot of credit is given by interviewees to the City Coordinator and other members of the team.
- So far as possible, research has responded to stakeholder needs. The main research topic in the original proposal came from the mesas de trabajo process, while additional topics on learning alliances and governance were identified by stakeholders and became work packages for SWITCH Cali. However, it was not possible to respond to every request and although researchers saw it as their duty to distil research needs from the stakeholder process, a more explicit research agenda would have been beneficial.

### Planning processes

The planning process led by SWITCH created a safe environment, in which a vision, strategies, alternatives and ideas could be developed, outside the direct pressure of public planning processes. Leading technical staff in key agencies are now in a better position to include SWITCH ideas in formal planning processes such as the development of Cali Vision 2036.

SWITCH Cali produced two key planning documents: a working paper on visioning, scenarios and strategy development that provided a long-term planning framework (Cinara, 2010), and a wastewater management framework (Cinara/Univalle, 2010) which was designed to act as a master plan for decontamination of water resources in Cali.

Developing a vision for 2040 encouraged stakeholders to think about the longer timeframe that some water problems require. This created an umbrella under which initiatives to address immediate and medium term problems could be taken.

When President Álvaro Uribe visited Cali in May 2009, he called for the urgent development of a national policy document for the upper Cauca River, known as the CONPES. Two learning alliance workshops were convened to provide input into this process and when the first draft of the CONPES appeared, learning alliance members pushed for amendments to focus better on waste reduction and a wider range of pollution sources.

Learning alliance members also actively participated in the consultative process for the municipal urban development plan (POT) which will define the direction of Cali's urban development over the next 10 years.

### Learning alliance: expanding from an alliance of peers

The learning alliance brought together 'an alliance of peers' - mainly senior technical staff from key stakeholders in urban water management. It created a space for inter-institutional collaboration on needs and priorities, and for research and planning processes. This core group promoted ideas from the alliance with decision makers in their own institutions and sought to

establish partnerships with consultants and construction companies to test new technologies and approaches in urban development.

Technical experts were won over to the concept of the learning alliance. Amparo Duque, from the regional environmental authority, saw how it brought partners together: "Institutions used to be quite jealous of each other. But, in the alliance, we learned to know each other, and even befriend each other. In such an environment, it is easier to be critical of oneself and of each other, without hurting each other". Diederik Rousseau, an advisor for UNESCO-IHE, liked the blend of discussion and practical action: "As an engineer, one thinks that all problems can be solved through technology; and social scientists think that talking does the trick... Now, I realise that the truth lies somewhere in the middle: both technological options and talking are needed."

There was unanimity among interviewees on the need to sustain the alliance after the end of the project but less agreement on how this could be done. Suggestions included establishing the alliance as an advisory body for the implementation of the CONPES; establishing it as a municipal water platform; finding it a place in structures arising from the newly published national water policy or leaving the alliance as an informal platform facilitated by Cinara/Univalle.

Effort was put into involving new stakeholders, particularly consultants and contractors involved in the city's expansion areas. The manager of one of the big developers in Cali said that the SWITCH concepts may have improved their ability to produce eco-houses which are attractive to buyers. However, he was concerned that municipal norms were not flexible enough to take advantage of some technical innovations.

SWITCH followed an approach perhaps best described as strategic opportunism, which means that when and where opportunities for consultation on new public policies emerged, SWITCH Cali, through the learning alliance, seized the chance and responded. Although well prepared when opportunities arose, there was a need for a more structured engagement. There was common agreement that the time had come in the final year of the project to reach out to community leaders, local and regional politicians and decision makers. Follow-up to the POT and Visión Cali 2036, gave the learning alliance an opportunity to engage with these groups. Not all of this outreach work needed to be conducted by the SWITCH project team itself. Some could be done by partners.

### Uptake of SWITCH concepts

The assessment concluded that interviewees had a better knowledge of and a more positive attitude towards some of the less controversial technologies and approaches discussed as part of SWITCH, such as water-saving devices or cleaner production principles to reduce contamination. They tended to be less enthusiastic about more complex changes like natural treatment methods for wastewater management. However, some respondents have become ambassadors in their own organisations for SWITCH ideas. For example, the EMCALI utility adjusted the terms of reference for consultants in the southern expansion zone so that they could include alternative technologies in housing development.

However, the institutionalisation of alternative technologies, approaches and thinking is at a much earlier stage of development and requires further work with decision makers. Signs of inter-institutional collaboration include an easier climate for sharing information, the

formulation of joint projects by more than one institution and a willingness, on occasion, to speak with a common voice. However, even at the end of the project there was a need for collaboration to become institutional rather than being based on interpersonal relations.

Disseminating SWITCH results

SWITCH worked to bring the results of research into University education and short courses, especially to train future engineers and other professionals in the new concept of integrated urban water management.

Documentation of project results was undertaken through research reports, conference papers and documentation of meetings and workshops. However, dissemination of results to city stakeholders could still be improved by ensuring that all key documents are available in Spanish as well as English.

Conclusions and recommendations

Conclusions

SWITCH aimed to contribute towards a more integrated and participatory approach in urban water management through a combination of demand-driven research and engagement with stakeholders, brought together within learning alliances. The initial entry point was on natural approaches to wastewater management. However, the development of the learning alliance approach in Cali reflected an important response by the project to the city’s demands, making it possible to further define the scope of the project.

The intervention logic was built up over time, using the main methodological elements provided by SWITCH, such as research, learning alliances, strategic planning processes and public policy advocacy. This process helped the team to define concrete activities together with SWITCH partners that fitted in agency plans but also responded to opportunities that arose. It proved to be essential to work with concrete activities that could show change and to remain flexible enough to embed these changed in existing plans.

Some important results contributed to the overall SWITCH objectives:

- SWITCH Cali contributed to the scientific basis for IUWM, both by creating a better understanding of the water cycle in Cali and its underlying processes, and by contextualising the feasibility of alternative technologies from elsewhere.
- Research on contextualising alternative technologies for wastewater management and in-house water devices, provided a critical analysis of the feasibility of these options in the local context. These generated interest from developers, contractors and authorities alike.
- A learning alliance was established, as a cross-institutional platform, with a core of senior technical staff from the city’s main institutions. This provided an area of confidence where stakeholders started to coordinate and collaborate, leading to a demand for it to become institutionalised.

- SWITCH Cali followed an approach of ‘strategic opportunism’ in which strategic opportunities to contribute to planning and policy making were seized, and results are still feeding into official municipal planning processes and consultation on the CONPES. It is recognised that it is time for a more concerted advocacy towards policy makers, politicians and community representatives.

There is a high degree of appreciation for the project, both in terms of the quality of its products and the methodology and processes followed. There was an explicit demand from all the interviewees that the processes which were set in motion – learning alliance platform, planning processes and research – should continue.

Recommendations

Recommendations for continuing after the project include:

- Developing a strategy to ensure that processes set in motion continue after the project.
- Taking steps to strengthen the interdisciplinary research agenda and explore further opportunities for funding research projects and initiatives.
- Continuing efforts to demonstrate alternative technology options as pilots in the southern expansion zone, and to use opportunities provided by the POT, Cali Visión 2036 and CONPES to identify possible future demonstration projects.
- Ensuring opportunities are realised to exchange experiences on alternative technologies (and methodologies) with the other SWITCH cities in Latin America: Belo Horizonte and Lima.
- Devising a strategy to help learning alliance members share the lessons learned from SWITCH within their home organisations, and to ensure the continuation of the learning alliance as a space for inter-institutional collaboration.
- Drawing up a strategy for advocacy towards public policy makers and for taking advantage of new opportunities to influence public policies.
- Continuing with participation in the consultative processes for the POT, Visión Cali 2036 and around the CONPES.
- Reaching out to stakeholder groups not then engaged with the learning alliance.

Acronyms used in this chapter

CONPES	National policy document for the Cauca River
EMCALI	Cali Municipal Enterprise (water, energy and telecommunications)
IRC	IRC International Water and Sanitation Centre, The Hague, The Netherlands
IUWM	Integrated urban water management
POT	Municipal urban development plan
SWITCH	Sustainable Water Management Improves Tomorrow’s Cities’ Health
UNESCO-IHE	Institute for Water Education, Delft, The Netherlands

References

Cinara, 2008. *Urban Water Management for the City of Cali; Diagnosis Report*. s.l.: s.n.

Cinara, 2010. *Learning alliance of Cali: Visioning, Development of Scenarios and Strategic Actions* (SWITCH working paper). s.l.: s.n.

Cinara/Univalle, 2010 *Wastewater Management Framework for the city of Cali, Colombia; A paradigm shift in the wastewater pollution control* (SWITCH Working Paper). Colombia: s.n.

Smits, S. et al., 2008. *Gobernabilidad e infraestructura hídrica urbana; un caso de estudio de Cali, Colombia* (SWITCH Working Paper). s.l.: s.n.

## 2.3

Tannery wastes dumped by the roadside. (Photo credit: Maarten Siebel)

Colombia



SOUTH AMERICA

## Starting at the top: preventing pollution from tanneries and cleaning up the Río Bogotá

By Monica Sanz and Laura Osorio

### Introduction

The Río Bogotá (Bogotá River) descends 370 kilometres through the plain of Bogotá from an altitude of 3400 metres above sea level in Villapinzón, before it discharges into the Magdalena River at 280 m above sea level (Bravo *et al.*, 1999). The upper river is relatively small and shallow with a limited gradient, until halfway along its route it passes Bogotá, not only Colombia's capital city but also an important industrial centre with 8 million people. Then the river descends more fiercely. As it arrives in Bogotá, the river has an average flow of 12 m<sup>3</sup>/s receiving at least 15 m<sup>3</sup>/s of mainly untreated wastewater from domestic and industrial activities<sup>1</sup> (EPAM, 1993). The Río Bogotá is perhaps one of the most polluted rivers in the world. In the city area, it was found to have a maximum total chemical oxygen demand (COD) of 475 milligrams per litre (mg/l) (maximum soluble COD is 128 mg/l) with a dissolved oxygen (DO) level of 0.05 mg/l (UNIANDÉS, 2002). In everyday language the Río Bogotá is a dead river.

<sup>1</sup>The 15 m<sup>3</sup>/s figure is from 1993. However, this flow has probably not increased dramatically since then despite significant growth in the city size. Since the year 2003, water consumption in Bogotá has dropped from 160 litres per cap per day to around 120 litres per cap per day (oral communication from the water utility of Bogotá, 2011) which suggests that wastewater from domestic sources has also declined per household.



The biggest polluter is the city of Bogotá and the wastewater it generates. Sewage treatment plants were found to have permanent financial, administrative, technical, operational and maintenance failures (Court Order, 2004). Today, considerable attention is focused on cleaning up the river, but these are expensive ‘end of pipe’ efforts that do not prevent pollution in the first place but seek to clear up the mess afterwards. In 2009, Colombia’s President Álvaro Uribe announced a US\$ 1.1 billion plan for restoring the Bogotá river basin by 2030, including a US\$ 330 million primary wastewater treatment plant to serve the city. In December 2010, the World Bank board approved a US\$ 250 million loan for the Río Bogotá Environmental Recuperation and Flood Control Project.

In the early years of this century, it seemed that cleaning up the upper catchment before the river reached Bogotá could provide hope and encouragement for recovery of the river further downstream. After all, this accounted for perhaps 5-10% of the total pollution load and some noxious chemicals. The Tibitoc water treatment plant and farmers in this important zone of horticultural cultivation, face operational difficulties because of high contamination levels in this part of the river.

Colombia has a vast number of micro and small sized enterprises (MSEs)<sup>2</sup>. They employ 81% of the nation’s workforce, representing 99.4% of the total number of businesses (DNP, 2007). MSEs in the industrial sector have a heavy impact upon the environment.

One of the biggest sources of pollution in the upper catchment of the Río Bogotá is from tanneries: mainly small-scale and family businesses which have been dumping their industrial discharges into the river without treatment for decades. The owners of these micro-tanneries are of indigenous background, with limited access to training or to technical, legal or financial support. Operating largely in the informal sector, this community has been overlooked by pro-poor policies and governmental support, and has instead been stigmatised as private-sector polluters. However, tanners were increasingly living below the poverty line (El Tiempo, 2004a).

Regulatory, market and persuasive policies often bypass such enterprises, reflecting uncertainties in the policy, scientific and methodological approaches to MSEs. Frequently, the only approach adopted is legal action.

Strategies for controlling pollution are ill-equipped to deal with such businesses. Cleaner production projects, designed to minimise waste and emissions of industrial processes through prevention strategies, are rarely implemented. Instead ‘end-of-pipe’ clean up approaches are promoted but these entail high investments, and are often unaffordable for MSEs (Cloquell-Ballester *et al.*, 2008; Montalvo and Kemp, 2008; Blackman *et al.*, 2007; Altham, 2007). As the viability of MSEs is threatened by pollution controls, this results in social unrest causing MSEs to be in frequent conflict with authorities.

How can small-scale businesses best be supported to clean up their act without losing vital benefits to the families they support and the wider economy? This question prompted a PhD student to combine her research with a highly practical intervention, and so started a

process that was later supported by SWITCH. It demonstrated that a trust-building multi-stakeholder approach that was focused on detoxifying relationships could ultimately also start to detoxify the river.

### Conflict over micro-tanneries on the upper Río Bogotá

Near the source of the Río Bogotá, lies a community of about 150 tanners of indigenous background. The small-scale tanning industry offers 700 direct jobs and represents the main commercial and industrial activity in the area. These small family-run industries have existed for decades and spread themselves along a 7km stretch of the river to the south of Villapinzón, a small town with a population of 8000 people about an hour by road from Bogotá. One third (51) of these micro-tanneries are within 30 m of the river bank, a zone that since 1977 has been considered “for preservation and protection use only” (INDERENA, 1977).

Until 1984 the tanners used natural tanning agents. Then the regional authorities began to promote synthetic tanning agents, with little or no oversight or support (Box 2.3.1). Chemical product salesmen and representatives of companies providing end-of-pipe technologies became the only technical advisors to these businesses. Today, tanning entails two basic processes that impact upon the environment: removing the hair from the hide (unhairing) with sodium sulfate, and the tanning process itself, using chromium sulfate.

The effluents from these micro-tanneries are discharged into the Río Bogotá with disastrous consequences. On leaving Villapinzón, the river had a COD of 102 mg/l in 2004 and high levels of chromium sulfate ( $\text{Cr}^2(\text{SO}_4)^3$ ) that at 0.3 mg/l were three times the safe limit for agricultural and domestic use. Discharges of chromium sulfate from the micro-tanneries were five to nine times higher than permitted by Decree 1594 on industrial discharges. According to the Regional Environmental Authority (CAR), these loads made it impossible to meet the water quality standards set for the year 2020 for this part of the river.

In the late 1990s, CAR started to impose sanctions on the tanners because of their harmful use of synthetic tanning products. They took the view that they had tried to solve the environmental pollution from this community around Villapinzón for more than 20 years without effective results. CAR pointed out that it had invested in 67 technical options that were still on its shelves and it had run out of patience. However, of these 67, all but one had been end-of-pipe solutions and only one was about cleaner production, which sought to prevent or mitigate the extent of pollution in the first place.

In 2003, several *acciones populares* (public interest claims) regarding pollution of the Río Bogotá were brought together at the regional judicial court under a single court order encompassing the whole Bogotá River.

By 2004, the tanners were considered to be solely to blame for the pollution. It was also clear from judicial proceedings, newspaper articles, and statements from tanners, CAR officials, and the Public Prosecutor, that land issues lay at the heart of the conflict. Their small-scale tanning industry had not been formally recognised and the tanners on the river bank were considered invaders without property rights (El Tiempo 2004c). Realising that no environmental rehabilitation project was being implemented, in February 2005 CAR took decisive action and closed 58 tanneries (El Tiempo, 2004b; 2005).

<sup>2</sup>MSEs are micro-enterprises (1-9 employees) and small enterprises (10-49) employees.



Chemical salesmen and local lawyers made a living out of the conflict without offering real solutions. Some lawyers manipulated the tanners to the point where they could not present legal defences because the legal terms had expired.

There were also divisions between the small tanners who wanted to hold onto land they claimed their fathers had owned, and a larger tanner who would have been happy to move to an industrial park elsewhere. Meetings tended to end in rows and acrimony.

In summary, the tanneries were facing restrictive regulation, big fines, closures and, in some cases were being forced to relocate away from the riverbank. As these mainly farm-based and household-level enterprises have limited capacities and resources, they had few options beyond the riverbank.

**Box 2.3.1 Tanners were trained in polluting practices**

“The medium sized tanner was always represented by renowned lawyers, whereas the small tanners only had occasional legal support. When small tanners spoke up in court this often turned into aggressive claims against the CAR and the government, leading to clashes with the judge.”

“I learned talking to the tanners that they learned the job from their fathers and still remembered that after scraping the hairs of the hide they soaked them in a mixture of water and smoked animal brains. In 1984 this form of natural tanning was replaced by synthetic tanning when tanners got training from the CAR (which at that time was only a Regional Authority but not yet concerned with the environment) who taught them the use of synthetic tanning agents (chemicals) and then left them to themselves for more than 10 years. They even got a diploma from the training.”

*Monica Sanz, PhD student, UNESCO-IHE, (Sanz, 2011)*

SWITCH action research

in 2003, a PhD student at UNESCO-IHE read about the conflict and began to think how the concept of cleaner production could be applied. Monica Sanz met with the Magistrate who was overseeing the court orders and he took an interest in her ideas for conflict resolution and for cleaner production. In December 2003, she organised a video conference between UNESCO-IHE in Delft and the main actors involved on the recovery of the Bogotá River.

The small tanners in Villapinzón asked her to help them resolve their conflict. She helped

them to present their property documents to the Public Prosecutor and together they identified a number of issues. From this action the tanners started to realise that they would have a better chance to overcome their problems if they were united.

Sanz adopted a six step process inspired by negotiation theory (Table 2.3.1) and started to work closely with the tanners. She also obtained the support from the Cleaner Production Centre (CRPML) in Cali to find cleaner production solutions for the tanneries.

Table 2.3.1 A six step process to negotiation

Step	Aiming at
Preparation	Initial definition of the problem based on: situation analysis, identification of interest and actors (possible allies), nature of relationships while also exploring the Best Alternatives for a Negotiated Agreement (BATNAs)
Building relationships	Sharing information and building trust
Redefinition of the problem	Internal visioning - initial consensus building strategy
Establishing common grounds first internally and then among all actors	Empowering communities for better win-win situations, identifying realistic and accurate options for improvement
Agreements	Establishing commitment
Implementation and follow-up	Implementing solutions: monitoring the process and providing feedback (dynamic process)

In August 2004, the court ruled that the small tanneries needed to include CP as a strategy for pollution prevention and that CAR needed to provide support. To her surprise, the Magistrate designated Monica Sanz to supervise the court order once it was enforced (Court Order, 2004).

Although there was no learning alliance involved in this process, the parallels can be seen. It was a learning process with multiple stakeholders addressing a real life problem. The process involved visioning, trust building and a process of redefining problems before seeking solutions. It also required facilitation. The first three steps took three months, during which time Sanz worked separately with the actors in small groups, particularly with the tanners.

Initially, CAR thought that the problem was caused because the tanners had rejected any solution offered to them. The tanners’ leader at the time believed that the problem was because they did not have the money to implement end-of-pipe solutions and that the authorities never listened to them.

By the end of step three some consensus was beginning to emerge about a number of issues. This included the fact that solutions proposed in the past had not taken into account the interests of the small tanners. CAR started to realise that their relationship with the tanners was interdependent and long-term and that the property rights of the tanners on the river bank needed to be respected. The strategy that was established was aimed at strengthening the tanners' association, legalising the tanners and helping them to sort out the legal barriers, solving the interrelated land issues, implementing appropriate cleaner production options, and implementing a business plan for competitiveness.

The small tanners chose a new leader and their association ACURTIR, now supported by 120 tanners, became stronger. They agreed on cleaner production as the preferred technical option and this was also supported by the Magistrate responsible for the court order. The tanners started to participate at the national leather committees at the Ministry, and the authorities began to respect the property rights of the tanners from the river bank. The tanneries were now eager to participate in pilot schemes with cleaner production. Despite some negative voices that sought to promote discord, trust was built with the researcher who was playing the role of a change agent.

**Box 2.3.2 Tanners had a vision for today and tomorrow**

In 2004, as part of the initial focus on defining problems and building trust, the riverside tanners were invited to describe their vision of how things would be in 2009 and in 2020. They foresaw that in 2009 they would still be tanners, but using cleaner production methods and, working with the CAR, would have resolved land ownership issues and be providing a better product with new markets. Many of these objectives were largely achieved, more or less to this timetable. For 2020 their vision was more ambitious, but still realistic. They believed that they would be exporting their products through their association and that they would have their own technical support centre for leather.

During the next steps stakeholders were brought together in larger groups. Methods for working in larger groups included 'open space technology' (OST) where participants were helped to create and manage their own agenda of parallel working sessions to discuss different topics and identify how to proceed and work together. A senator who participated in the first OST decided to support the conflict resolution process and opened channels with the Office of the Presidency, the President himself and the Chamber of Commerce. It took more than one meeting to reach solutions as CAR stated that it needed to get proof of the tanners' will to change before supporting a cleaner production project. CAR only gradually accepted this technical option, partly because they did not think it suitable for highly polluting industries and because they had no legal control.

The negotiation processes produced changes in the power relationships. The large tanner in the process lost power in relation to the small tanners. Meanwhile the small tanners replaced their leader and they supported another candidate for mayor in 2007 who then won the elections.

In contrast to the rapid progress made during the first three steps, reaching a final agreement (step five) took a further 2.5 years, during which time five large meetings were held.

Once the tanners started to show their willingness to change, notably by visiting a tannery in El Cerrito (Cali) that was implementing cleaner production and choosing technological options, resources began to be mobilised. The Bogotá Chamber of Commerce offered financial support for the necessary legalisation process. The tanners responded by approving this process and providing 15% of the finance themselves.

In 2006, it was agreed that SWITCH (just launched globally) would give financial, administrative and technical support to the conflict resolution work with the Bogotá tanners and authorities. SWITCH worked with a Colombian institution that came to be the Universidad Nacional at the Institute of Environmental Studies (UNAL).

**Box 2.3.3 Training provided on and off site**

Fifty tanners participated in ten training sessions provided by the leather industry Technical Development Centre in Colombia CEINNOVA, including both theoretical and practical issues: best available technologies (BAT); good operational practices (GOP); process control; industrial safety; solid waste management; cost control; marketing and association building. Educational material was designed and 30 site visits were made to provide other tanneries with instruction about cleaner production. In addition, seven training sessions were carried out for operational staff in the 12 pilot tanneries.

From 2007, the Colombian Institute for Science and Technology (COLCIENCIAS) and the regional authority CAR, co-financed the SWITCH project in Bogotá. The NGO AVINA also contributed with resources for a pilot industry. Prestigious lawyers supported the process through their Social Community Work programme. The Office of the Governorship, the Public Prosecutor and the Ministry of the Environment spent time helping to resolve the tanners' land problems and they put pressure on the environmental authority's board of directors to reach an agreement. CEINNOVA, the Technical Development Centre for the Colombian leather industry - provided training.

Initially, the Chamber of Commerce handled the resources needed for the legalisation. Once the SWITCH project started, the financial resources were administered by UNAL. However, the process continued to be facilitated and led by Monica Sanz working with the tanners. During step six (implementation), SWITCH-UNAL helped to initiate a pilot project for

cleaner production in six small tanneries, and CAR joined in co-financing another six. These 12 improved their operations, reduced their negative impact on the environment and served as a learning experience and example for improved unhairing and better control of pollution.

It can be argued that by the time SWITCH became involved, the biggest hurdle had already been cleared – the parties were talking to each other and were actively involved in trying to resolve the problems. However, SWITCH brought new finance, institutional resources and commitment to the work that the tanners had begun with Monica Sanz, with the support of some key people in the political system and key organisations.

The SWITCH intervention did not change the overall direction of this work but it strengthened efforts to end the social exclusion of tanners and to find effective alternatives to expensive end-of-pipe focus in dealing with pollution. The strategy was based on internal strengthening of the target communities, and on building strategic alliances to address the different issues at stake.



Processing hides (Photo credit: Carol Howe)

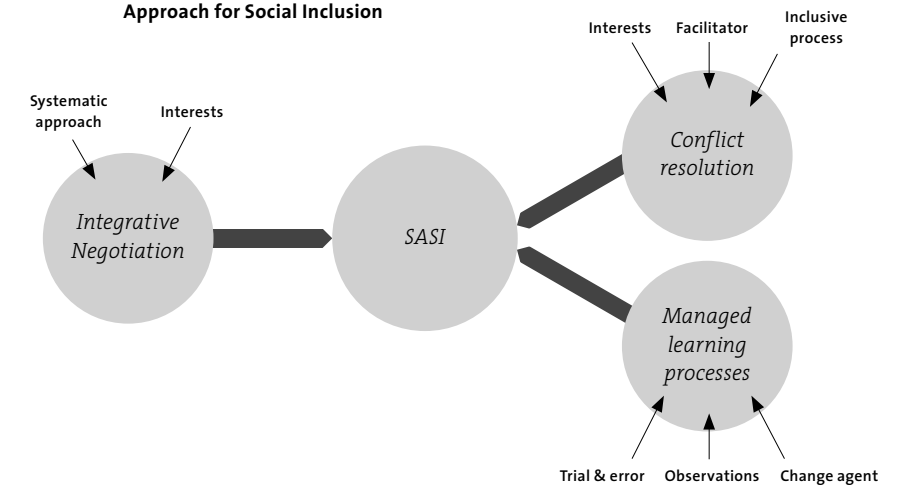
#### Box 2.3.4 Systematic Approach for Social Inclusion (SASI)

SASI (Systematic Approach for Social Inclusion) is a methodology based on an integrated theoretical and methodological framework inspired by the theories of negotiation, conflict resolution and managed learning (action research), as illustrated in Figure 2.3.1. These approaches were selected for their suitability in handling the complex situation of the MSEs in Villapinzón. Together, they implied working with big groups implementing a process that is planned, problem solving based on trial and error, and a process that was both systematic and at the same time, highly participative and respecting of the interests of the MSEs.

Participants were helped to create and manage their own agenda of parallel working sessions to identify how to proceed and work together. They also used Appreciative Inquiries (AI) an approach that asks questions and envisions future positive relationships and a system's capacity for collaboration and change.

The parallels between SASI and the learning alliance approaches found in other SWITCH cities are apparent. In this case the process focused on a specific social conflict with related power issues and technical objectives.

Figure 2.3.1. Key elements of the SASI Systematic Approach for Social Inclusion



During managed learning, the researcher plays the role of a change agent who (a) engages in the process and differentiates when she or he needs to be a helper, a facilitator or a mediator; (b) recognises the importance and uniqueness of the context; (c) facilitates an open learning process based on trial and error and the special characteristics and culture of a given community, and on mutual learning, instead of adopting preset models; and (d) is mainly motivated towards empowering vulnerable communities to solve their own problems (Lewin, 1946; Schein, 1996).

Despite the progress being made, closure orders were still in force and did in fact take place. During a two year period when many small tanneries were shut down, it was of course even more difficult to carry on with the cleaner production environmental plans. However, the SWITCH project was a strong supporting factor.

Activities supported by SWITCH involved:

- Research on sustainable discharge limits from tanneries through learning about the long-term effects of pollution.
- Determining the best cleaner production options for the micro-tanneries.
- Implementing cleaner production options in six tanneries initially, and then six more with support from the environmental authority.
- Supporting training on the best available technologies (BAT) but also on the good operational practices (GOP) and elaborating training material.
- Monitoring the progress and impacts of implementation.
- Developing demonstrations on solid waste management and use derived from residues from the tanning process.

Throughout this process the tanners were actively involved in developing innovative control processes.

## Outcomes

The dispute between the authorities and the tanners in the upper reaches of the Bogotá River was at first seen to be about unacceptable pollution of the river. On closer inspection it was clear that it was also about land rights and to some extent, the social exclusion of a community from the decision-making process. Efforts to prevent the tanners from polluting the river had been largely coercive and had failed to engage effectively with their interests. Intermediaries acting on behalf- of the tanners had not always acted in their best interests. The only solutions on offer were about treatment plants.

A first step to overcome some of the conflicts was to establish the tanners association, ACURTIR. This began to represent the interests of the smaller tanners, which were not the same as the large scale tanners. The tanners sought help from several sources, the Mayor, a sympathetic official in environmental authority, a sympathetic Senator and the ombudsman (*Procuradía*). Thanks to the efforts of the Senator, even the President of the country took an interest in what was happening.

The process that followed the initial intervention by Sanz was one of gradual engagement. Supported by some key champions, the tanners and the authorities began to communicate better and to work towards more positive ways of dealing with the problems.

Out of 80 tannery businesses in the area, around 50 attended training sessions, 30 tanners adopted cleaner production methods and 12 involved themselves in detailed research. SWITCH and the University of Colombia became involved at a relatively late stage, once the actors were on speaking terms. But they were able to step up research focused on

understanding production processes and the effectiveness of cleaner production processes in reducing pollution, and also the governance, legal and conflict issues associated with the problem.

The outcome so far is by no means perfect. There was pollution before and there is still some pollution now. But those tanners who have adopted cleaner production methods have dramatically reduced their impact on the river water and their rights as landholders, and as an industry, have been established. The technical efforts have produced positive results.

- Thirty tanneries that did not have planning conflicts implemented cleaner production options along with physicochemical treatment.
- Pollution levels from two tanneries have been measured since 2004. Since starting cleaner production, these have shown reductions in pollution loads by one third to two thirds in chromium and from 60-72% in BOD<sub>5</sub>.
- These industries have adapted their unhairing processes, and are recovering hairs from the first wash to make compost rather than discharging them into the river. They bought a land plot to use as a common compost site. Fats are also recycled and used rather than thrown away, and they use fewer chemical inputs.
- Water used for washing skins is collected and recycled. The amount of water being used has been reduced substantially. Between 2004 and 2009, 30 legalised tanners saved 70% on water consumption and reduced their discharge into the river.
- Fifty tanneries within 30 meters of the river bank have had their property rights recognised and are waiting to be relocated by the Governor.
- Twenty tanneries have been bought by the construction company that works on the highway passing through Villapinzon. Fifty industries that had faced planning uncertainty still have to adopt the technical improvements.
- In 2010, in a unique judgement, a local judge agreed that tanners could work on a project for environmental recovery to 'work off' their fines, instead of paying them in cash.
- Industrial use has been established for tanners' lands, allowing them for the first time to invest in their own futures with confidence.
- The tanners' association ACURTIR has emerged stronger, and is developing an environmental section for members to help each other and a commercial/ business department to improve marketing.

The problems that have not yet been successfully addressed are those related to economic viability, although business training is now offered to the tanners and access to loans from the Ministry of Commerce is being explored.

There is also still a problem with the institutional culture of the Regional Environmental Authority (CAR) where, despite progress with the tanners, the general approach continues to be one of non-participation.

### Detailed outcomes

In practical terms the strategy set jointly with the stakeholders aimed to strengthen the tanners' association, legalise the tanners and help them to sort out legal barriers. It also involved solving interrelated land issues, implementing appropriate cleaner production options, and implementing a business plan for competitiveness. The strategy is presented in Table 2.3.2 together with the progress achieved to the end of 2010.

Table 2.3.2 SWITCH intervention strategy and progress up to year 2010

Issue	Aim	Progress
United tanners willing to change	More empowered tanners with better negotiating power and able to improve the outcomes of the negotiations.	<p>The micro-tanner association has become stronger. They now participate at the national committees at the Ministry. They are supporting the change process by consensus. They have travelled to the Cerrito Tanneries in the Valle del Cauca in order to learn about cleaner production. A positive and new leader is responsible for the association. There is consensus on the tanners' problems among all the direct stakeholders. Cleaner production is acknowledged among tanners as the right technical pathway to follow. The solutions built by the tanners were supported by the Presidency of Colombia, the National Comptroller, the Governor and the Ministry.</p> <p>The tanners are being represented positively on the media. The newspapers show a different perspective on their conflict.</p> <p>Their association (ACURTIR), with 120 partners, has established principles based on conflict resolution as their organizational framework.</p> <p>The tanners have learned to deal with high decision-makers such as the National Comptroller.</p>
Process of Legalisation	The Environmental authority (CAR), control authorities (Public Prosecutor and National Comptroller) and the Magistrate in charge of the court order on the Bogotá river, willingness to engage in constructive discussions with tanners.	<p>Of 150 micro-tanneries, 86 were legalised in 2005 once they presented their PMA (Planes de Manejo Ambiental in Spanish) or environmental plans based on cleaner production and CAR accepted them. The tanners supported 15% of the costs of this process. The Magistrate ruled that Cleaner Production (CP) should be implemented in the area. A strategic alliance was established after the first big group OST with a senator who was sensitive to the Bogotá River's problem. Support given from the Chamber of Commerce to finance the elaboration of the PMAs thanks to the senator's support. Pressure on CAR from the Office of the Presidency afterwards to allow the CP implementation also thanks to the senator's support.</p> <p>February 2010. For the first time in Colombia, a local judge allows the possibility of conducting a project for environmental recovery as a substitute for fines – in other words working constructively instead of paying fines.</p>

Inter-related issues	Reaching sustainable solutions by integrating land and environmental issues, for example by coordinating policies on land use and policies on the quality of the river water in the same area.	<p>Control authorities and political stakeholders such as the President of the Senate in Colombia are supervising the process in order to solve the land conflicts. The Office of the Governorship influences CAR's directive board to work by integration. The mayor gives priority to the land issues of the tanners. The properties on the river bank will be purchased by the Governorship.</p> <p>The river bank policy was set in 2009. Tanners beyond 30m from the river bank are allowed to work.</p> <p>Industrial use was established in December 2010 for the tanners' lands. They can now invest without uncertainty in their industries that are in a formally recognised industrial area.</p>
CP Project SWITCH	A technical solution for MSEs in accordance with the requirements from the law, that supports prevention, and is consistent with the interests of the tanners.	<p>SWITCH-UNAL started in 2006.</p> <p>Colciencias (Colombian Institute for Science and Technology) co-finance activities from 2007.</p> <p>The Authority CAR itself co-finance the tanners' training in CP, relying on support from academia.</p> <p>The tanners are trained in CP and environmental matters, leading to innovations in unhairing processes originating from tanners themselves.</p> <p>Between 2004 and 2009, reductions in pollution loads were achieved of 32-68% in chromium and 60-72% in BOD<sub>5</sub>, when discharges to the river were measured in two of the 12 pilot tanneries. Savings in water use from 24-68% were recorded. Tanners are doing solid valuation (composting) from the grease and hair residues. They bought a land plot for this common purpose.</p> <p>A decision-making tool was created for tanneries. The tool is based on sustainability indicators.</p>
Business Development programme	More efficient production processes and better marketing.	<p>Colciencias-UNAL also concentrated the efforts on the competitive issues.</p> <p>The Colombian Technical Development Centre for Leather gives training on how to achieve better quality products. The tanners are trained on business matters by the faculty of Business Administration from UNAL.</p> <p>Access to loans from the Ministry of Commerce is being worked out by the change agent.</p>

# Conclusions

Six years of multi-issue, multi-level and multi-stakeholder negotiation has succeeded in reducing the environmental impact from the tanneries in a way that does not threaten the viability of the micro-industries and that meet the interests of the regional authority. Tanners in the area are following a trend towards adopting preventative technical strategies.

Within the scope of this study, the following conclusions can be drawn:

- Technical solutions could only be implemented once the impending social challenges were faced and consensus had been built with stakeholders. Integrating land issues and environmental issues proved to be a priority.
- The authorities and communities came to see that they were interdependent and that they needed to build long-term relationships to help build consensus and establish a commitment for change processes.
- A social inclusion process is a shared responsibility by all stakeholders, even if this originates from a conflict. Indeed, conflict can be viewed as an opportunity for positive change, instead of being seen as an obstacle because people are more amenable to change when they are going through a crisis. The tanners were facing a crisis and were eager to change.
- By establishing strategic alliances (as with politicians), the micro-tanners’ negotiating power was boosted and their interests were respected. The role of champions was very important in this case since it opened up lines all the way to the Presidency and this focused everyone on trying to reach a solution.
- Environmental regulators have shifted towards a more preventative approach rather than relying only on punitive methods.
- The researcher’s role started with ideas of cleaner production, but quickly became the role of a change agent. This was a demanding and complex task that implied commitment to the process on a long term basis. She had no position of power and could only work by agreement. She was successful in that she was independent, offered holistic approaches and stayed with the process over a number of years.
- Finance is an issue for micro-industries. Along with the interrelated land issues, access to credits for MSEs was the most difficult task.

The methodology adopted in this case contains elements that may have implications for cities around the world that are tackling issues of environmental pollution along with the sustainability of marginalised communities. SASI is based on a pragmatic and selected mix of methods that is anchored on universal principles and theories. The parallels between this methodology and a learning alliance approach have already been drawn. The key principles are the involvement of all stakeholders in a platform where all their rights and concerns are respected, the process is facilitated and the person who coordinates and facilitates the process must be trusted by all sides. Those involved in the discussions are responsible for re-defining the problem and reaching common ground on methods for resolution. Learning and action research go hand in hand.

Some outstanding issues are still being addressed. These include access to credit, and how to mobilise funds for co-financing the more expensive solutions. Work on dealing with all outstanding fines also needs to be completed. There is a national comite de veeduría under the National Comptroller that could play the monitoring role in ensuring that commitments are followed up.

## Acronyms used in this chapter

ACURTIR	Tanners’ Association for Villapinzon and Choconta
AI	Appreciative Inquiries
AVINA	NGO specialising in sustainable development
BAT	Best available technologies
BATNAs	Best Alternatives for a Negotiated Agreement
CAR	Regional Environmental Authority
CEINNOVA	Colombia Leather Industry Technical Development Centre
COD	Chemical oxygen demand
COLCIENCIAS	Colombian Institute for Science and Technology
CRPML	Cleaner Production Centre
DO	Dissolved oxygen
GDP	Gross Domestic Product
MSEs	Micro and small sized enterprises
GOP	Good operational practices
OST	Open space technology
PMA	Environmental management plans
SASI	Systematic Approach for Social Inclusion
UNAL	National University of Colombia
UNESCO-IHE	Institute for Water Education, Delft, The Netherlands
UNIANDES	University of the Andes
SWITCH	Sustainable Water Management Improves Tomorrow’s Cities’ Health

## References

- Altham, W., 2007. Benchmarking to trigger Cleaner Production in small businesses: Dry cleaning case study. *Journal of Cleaner Production*, 15, pp. 798-813.
- Anon., 2004a. Los grandes costos de la pobreza. *El Tiempo*, 8 Aug.
- Anon., 2004b. Curtiembres, a cumplir la norma. *El Tiempo*, 12 Mar.
- Anon., 2004c. Hora cero para curtiembres y mataderos. *El Tiempo*, 15 May.
- Anon., 2005. Cierran 59 “fábricas” de cuero. *El Tiempo*, 28 Jan.
- Blackman, A. *et al.*, 2007. Voluntary Environmental Regulation in Developing Countries: Mexico’s clean industry program. *Resources for the future*, pp. 34.
- Bravo, D. *et al.*, 1999. *Hacia la metropolización de la Sabana de Bogotá. Por una planificación del desarrollo sostenible*. s.l.: Regional Environmental Agency (CAR).
- Cloquell-Ballester, V.A. *et al.*, 2008. Environmental education for small and medium-sized enterprises. Methodology and e-learning experience in the valencian region. *Journal of Environmental Management*, 87, pp. 507-520.
- DNP, 2007. Conpes 3484. Política Nacional para la transformación productiva y la promoción de las Micro, Pequeñas y Medianas Empresas. *Un esfuerzo público-privado*, pp. 32.
- EPAM Ltda., 1993. Estrategia de saneamiento del río Bogotá. *Informe principal*, June.
- Holman, P., Devane, T. & Cady, S. eds., 2007. *The Change Handbook: The Definitive Resource on Today’s Best Methods for Engaging Whole Systems*. s.l.: s.n.
- INDERENA, 1977. Decreto 1449.
- Lewin, K., 1946. Action research and minority problems. *Journal of Social Issues*, 2, pp34-46.
- MAVDT, 2010. *Política Nacional de Manejo Integral de Agua*.
- Montalvo, C. & Kemp, R., 2008. Cleaner technologies diffusion: Case studies, modelling and policy. *Journal of Cleaner Production*, 16 (1), pp. 51-56.
- Order, 2004. *Sentencia sobre la recuperación del Río Bogotá*. Tribunal Contencioso Administrativo de Cundinamarca, Magistrada Nelly Yolanda de Villamizar.
- Raiffa, H., Richardson, J. & Metcalfe, D., 2002. *Negotiation Analysis. The Science and Art of Collaborative Decision Making*. s.l.: Harvard University Press.
- Ravetz, J., 1999. What is post-normal science? *Futures – The Journal of Policy, Planning and Future Studies*, 31 (7), pp. 647-653.
- Sánchez-Triana, E., Ahmed, K. & Awe, Y. eds., 2007. Environmental Priorities and Poverty Reduction. A country environmental analysis for Colombia. *Directions in Development*. s.l.: The World Bank.
- Sanz, M., (*in press*) *The tanneries of Villapinzon, Colombia*.
- Schein, E., 1996. *Kurt Lewin's Change Theory in the Field and in the Classroom: Notes Toward a Model of Managed Learning, Systems Practice*. [Online] Available at: <http://dspace.mit.edu/bitstream/handle/1721.1/2576/SWP-3821-32871445.pdf;jsessionid=Do7EoCEC9DC3410DE33D13015EE56077?sequence=1> [Access 29 June 2011].
- Thompson, L., 2009. *The Mind and heart of the Negotiator*. 4th ed. Prentice Hall editors: Kellog School of Management, North Western University.
- UNIANDES, 2002. *Campañas Río Bogotá*.

# Water management and urban planning in Belo Horizonte

Sônia Knauer, Nilo de Oliveira Nascimento, John Butterworth, Stef Smits and Emanuele Lobina

## Introduction

Belo Horizonte was born as a city of the future; established in the 1890s as the first modern planned city in Brazil. Belo Horizonte was designed by chief engineer Aarão Reis as capital of Minas Gerais state, with a grid structure of broad streets, squares and parks. It grew rapidly and in the 1950s the great Brazilian architect Oscar Niemeyer won a competition to develop the area around Lake Pampulha. The city now has 2.2 million inhabitants, rising to 3.9 million across the 33 municipalities that make up Belo Horizonte Metropolitan Region (RMBH).

Water management in Belo Horizonte has kept pace with population growth, connecting 99.7% of Belo Horizonte residents to a safe supply (Nascimento *et al.*, 2007) and operating to high reliability and quality standards. Coverage of sewerage systems is also high (92%), but a shortfall in the number of interceptors to transport wastewater to treatment stations and a number of illegal connections into stormwater drains, means that sewage still ends up in rivers and seeps into groundwater. From the 1970s to the mid-1990s, stormwater drainage investment was focused on lining rivers and the construction of closed drainage channels. Despite the high cost of this work, the number of floods did not reduce and there has since been a shift to reflect the original greening principles of the city by fitting drainage works into their natural contexts and developing more parks and recreation areas. Investment has gone into wastewater interception and treatment, restoration of urban creeks and piloting technologies such as detention ponds and wetlands.

# 2.4

Trainees constructing a rainwater harvesting tank at Barreiro productive garden.  
(Photo credit: Thiago Salles)



Brazil

SOUTH AMERICA



Belo Horizonte



Since the end of the military dictatorship in 1985, the Municipality of Belo Horizonte (PBH) has put considerable energy into democratisation, exemplified by participatory budgeting (known as OP), where citizens can propose works for the municipal budget and vote on priorities. The Municipal Sanitation Council, COMUSA, has a mandate to prioritise investments in sanitation with participation by representatives of local government and civil society (Smits *et al.*, 2008).

## SWITCH in Belo Horizonte

SWITCH came to Belo Horizonte in the second half of 2006 aware that innovative practices were already being introduced. SWITCH saw its role as complementary, adding fresh creativity and value to existing processes towards sustainable urban drainage and joined-up water governance. The overall goal of the whole SWITCH project was to catalyse change towards more sustainable urban water management in the 'City of the Future', and in Belo Horizonte the main aim was to strengthen and democratise decision making processes on urban water management. The intervention logic of SWITCH was to build upon ongoing changes by developing research, demonstration projects and capacity, so that research would be brought into use. SWITCH encouraged an integrated approach to research into technological, hydrological, economic and governance aspects of urban water. The plan was to integrate these elements through learning alliances that would link researchers, knowledge managers and research users. They would help to define the research agenda, participate in the research itself and act as the main channel for dissemination and scaling up.

### Who was in SWITCH?

The Universidade Federal de Minas Gerais (UFMG) was already working closely with the Municipality, researching issues such as hydrology, technology and costs. The opportunity to participate in SWITCH was a logical step. The Municipality was especially interested in evaluating drainage interventions in real-life settings and in governance research that could strengthen participatory management models for urban drainage. UFMG was primarily interested in carrying out research into innovative approaches to urban drainage and in participating in an international network of researchers and cities. These two bodies became the lynchpin of the SWITCH alliance.

### Main goal for SWITCH

The main goal for SWITCH in Belo Horizonte was formulated as: "to improve development of, access to and use of information and knowledge on different aspects of urban drainage alternatives by all relevant stakeholders (authorities, researchers and community) so as to strengthen and democratise decision-making processes on urban water management."

The specific objectives were to:

- Improve capacity to identify flooding risks and to respond through enhanced monitoring and use of modelling tools.
- Introduce, test, adapt and showcase innovative urban drainage technologies which reduce flooding risks whilst contributing to an improved urban environment.
- Assess and strengthen participatory management models for urban drainage within a broader IWRM institutional framework.

### Intervention logic – links at every level

The intervention logic was threefold: to build links between different types of project activities, build upon existing initiatives and work at different levels of scale. SWITCH Belo Horizonte has tried to address relevant issues at each level:

#### Local level

Technology demonstration projects and local alliances were established. Demonstrations included: monitoring and research of urban drainage technologies including infiltration trenches, construction of wetlands and rainwater harvesting infrastructure in schools, parks and on the University campus. Research focused on the technological and hydrological aspects, as well as on costs. Learning alliances at community level acted as platforms for analysis, learning and capacity building around the research and demonstration projects. Local alliances consisted of community institutions (schools, health centres), individual community members, and municipal officials and technicians. Training and awareness raising activities were organised, with special attention paid to supporting committees involved in participatory budgeting to formulate proposals.

#### Sub-catchment level

There were 256 sub-catchment drainage areas used for planning in the Municipal Sanitation Plan. At this level flood risks were analysed and mitigation interventions were planned.

#### City level

The focus at Municipality level was in the institutional sphere, and included research on governance and the institutional learning alliance. A learning alliance at institutional level was set up to provide a platform to generalise the results at a broader scale within Belo Horizonte as well as at the wider metropolitan regional level. SWITCH briefed OP (participation) officials about improved urban drainage.

#### Belo Horizonte Metropolitan Region (RMBH)

The wider metropolitan level was seen as a level for scaling-up, for example, by involving stakeholders from other municipalities in institutional learning alliance activities.

#### Velhas catchment level

Stakeholders from this level were considered a target for scaling up actions.

### Intervention logic – based on existing initiatives

In line with the approach to add value to initiatives and structures already in place on urban water management, and to create leverage in terms of scaling up, SWITCH:

- Built on earlier programmes to apply new approaches to urban drainage, notably DRENURBS, a participatory programme with a focus on river restoration, pollution control and flood control, and PROPAM, aimed at the rehabilitation of the Pampulha reservoir.
- Used existing baseline information collected specifically for the Municipal Sanitation Plan.
- Made links with other projects, such as PROSAB, a network of Brazilian cities working on sanitation, and the Global Change Committee, developing local policies to deal with climate change.
- Learned from international best practice through links with other SWITCH cities and international networks.

The added value of SWITCH lay in the structured evaluation and validation of technologies, none of which was entirely new to Belo Horizonte (some were used in DRENURBS). SWITCH also set out to bring critical analysis and research to existing governance arrangements for drainage. The use of learning alliances to disseminate and facilitate the uptake of research results was another example of complementarity.

## Outcomes

### Demonstration activities

Demonstration activities have formed the heart of SWITCH, varying from simple smaller-scale technologies, often involving schools, to more complex large-scale demonstrations. They included infiltration trenches to reduce flooding from roads, the construction of permeable areas and rainwater harvesting. The largest project – construction of the Vilarinho Wetland to treat polluted urban storm and wastewater – was completed in November 2010 with monitoring beginning in January 2011. By the end of the project in April 2011 it was still too early to assess the effectiveness of the technologies, but demonstrations were made visible (and made SWITCH visible) through extensive community involvement.

The technically simpler demonstrations, such as rainwater harvesting and infiltration trenches, were completed early enough for research and dissemination activities to run for a period of time. However, all the demonstration activities suffered delays in design, tendering or procurement of equipment, mainly owing to the lengthy procedures that needed to be followed within the Municipality. This reflects the reality of municipal service delivery, with all its strengths and weaknesses; short-cutting such procedures would have given a false impression of the potential for scaling-up. Rooting demonstrations and learning alliance activities in the Municipality has strengthened the potential for replication through future investment.

In some cases replication has already happened. The Municipal Parks Foundation is now considering roofwater harvesting wherever possible to reduce demand on mains water in parks and agro-ecological centres. This is innovative in the urban context in Brazil. Parks staff who were involved in training at a demonstration project have acquired an interest and skills that they can replicate.

At sub-catchment scale, the focus was on alternative infrastructure (such as infiltration trenches, collector drains and the development of surrounding parks), and carrying out related monitoring and research. Although there was no learning alliance at this level, the results fed into the institutional level learning alliance developed during the second part of the project. Some wetland demonstrations were completed near the end of the project, which put the monitoring research at risk. However the University and COPASA are committed to supporting this ongoing work even though the SWITCH project has ended.

### Mobilising through learning alliances

Local learning alliances set up around smaller demonstration projects typically included:

- schools and their communities (teachers, students and parents)
- broader groups of community members
- officials and technicians of various municipal units, e.g. health points, participatory budgeting or Parks Foundation
- officials from one of the nine regional offices of the Municipality
- municipal officials and engineers from the centre, e.g. SUDECAP or the Education Secretariat.

Schools proved excellent locations, with the possibility of involving pupils in the demonstration research. They also have the capacity to mobilise the broader community in their neighbourhoods, promote horizontal scaling-up as students and teachers share their knowledge and take local action.

At the Anne Frank School, where rainwater harvesting allowed the school to conduct experiments on water conservation and reuse, the value of the environmental education probably even exceeded the value of testing the technology.

At the Pedro Guerra School in the Vilarinho sub-catchment, SWITCH proposed a wetland to remove pollution, replace concrete culverts with a more natural and greener environment and provide a recreation area. Pupils were involved in a study as a basis for technology selection and design. They also played a role in mobilising the community and monitoring implementation.

The Pedro Guerra School was involved in “um dia na bacia” (a day in the catchment) when the school community, officials and the broader community visited the local drainage area, identified good and bad practices and organised competitions for young people. An event organised by the Lagoa do Nado Park alliance was attended by the Lidia Angelica School and by Danielle Mitterrand, former first lady of France and now President of the Foundation France Libertés.

Overall awareness about the importance of drainage and urban water management was raised within the communities. The Lidia Angelica School submitted a drainage project to the participatory budget (PO) to reduce local flooding around the school, and this proposal was shortlisted. Pedro Guerra School supported the inclusion of the wetland and surrounding green areas into the participatory budget.

Local demonstration projects generated enthusiasm and expectations among the local alliances. However, maintaining this enthusiasm and interest is a key challenge, especially to develop activities that can scale up the work done during the project. Possible ways to replicate activities with schools could involve the education department or the water and sanitation utility, COPASA, or to seek funds to continue the work. Schools operate under very tight budgets and need financial support for such additional activities.

Schools are not the only places with influence in communities. Local officials also scale-up new practices to other areas in their jurisdiction. Sérgio Augusto Domingues (Guto) is responsible for parks and green areas in his part of the city, which used to be plagued by crime. Since the establishment of the Parks Foundation a couple of years ago, the number of public parks and green areas has increased by 50%. Guto is passionate about his parks and very enthusiastic about the Lagoa do Nado Park, where a SWITCH demonstration worked on protecting springs, the use of more natural drainage channels and the reduction of pollution flows. Guto is learning how to bring similar technologies and approaches to other parks in his area.

### Engaging higher education institutions

SWITCH involved a large number of students at UFMG with an impressive range of MSc and PhD research topics. The hydraulics and hydrology group, the management/governance group and geosciences all became involved as researchers in the Belo Horizonte urban drainage study, each bringing different disciplinary perspectives like engineering, hydrology, political sciences and economics. SWITCH supported collaboration across departments but attempts to translate this into genuine interdisciplinary research were not always successful. Contacts between research departments were mostly on an individual basis.

A scholarship programme from UFMG, with the support of Federal and State level funding agencies, provided about 90% of scholarships for PhD and MSc students involved in SWITCH-related research. UFMG researchers received support from the network of SWITCH partners including staff and students from the United Kingdom and the Netherlands, and supporting researchers in France and Switzerland. Belo Horizonte fed their own results into international SWITCH learning and both sides have been satisfied with the level of support and coordination.

A defining characteristic of most SWITCH research has been its links to demonstration activities. Such real-world research poses challenges as it is more difficult to measure control factors and access sites with monitoring equipment. However, the Municipality considered it important to validate use of the technologies in real settings, reflecting the realities of maintenance, costs, etc.

There is often a cultural or professional divide where academics see their role as being to understand, criticise and provide recommendations but not directly to engage in change processes. This gap seems to have been bridged fairly successfully in Belo Horizonte. Research students forged bilateral links with the utility COPASA for example, made inputs into practical training courses and presented research results at learning alliance events. Municipality staff enrolled as students for courses linked to their work, while some students involved in the project are now working for the Municipality.

Research projects associated with learning alliance activities in Belo Horizonte include:

- Sustainable drainage systems (SUDS) such as detention trenches and infiltration trenches to assess performance in terms of runoff control, pollution abatement and risk assessment of soil pollution.
- Rainfall harvesting in schools, urban agriculture and households for uses that do not require drinking water standards.

- Flood studies, including flood damage assessment in urban areas, traffic management during flood risks, perception of flood risk by populations living near flood areas and assessment of the flood resilient buildings in the Belo Horizonte context.
- Water governance studies, including institutional mapping of water management in the PBH and an evaluation of the recently implemented model for integrated water management.

Governance-related research has focused on understanding and validating current governance arrangements, rather than creating a new model. In general the research has found that current governance arrangements are well developed in terms of participatory democracy compared to other cities in Brazil and elsewhere in the world. It has proved difficult to define strategies for institutionalising or scaling-up results of governance research. However, learning alliance processes are a form of institutional change and since 2008 a PhD student and a member of the learning alliance staff have researched and documented the functioning and impact of the learning alliances.

### Institutional learning alliance: scaling up within the Municipality and beyond

A strength of the project in Belo Horizonte was the high level of involvement of the Municipality as an official consortium partner. This made it possible to make important connections with potential for uptake and to make links with ongoing government programmes. Municipal procedures can be bureaucratic but this was considered a necessary price to pay for a project being rooted within the key organisation that is able to support uptake of research and demonstrations.

The Municipality allocated a senior staff member to facilitate the learning alliance and she was able to make SWITCH visible and mobilise others at a high level. This greatly increased the impact of the project. It did not prove possible to involve all Municipal departments and more support could have been provided for the facilitator from the project consortium. Maybe it would have helped if the SWITCH vision had focused more on municipal concerns, such as how new approaches can reduce operation and maintenance costs.

Nevertheless, installing the facilitation role within the Municipality has had a major impact. It would have been difficult for an outside facilitator to mobilise Municipal departments and ensure that results were institutionalised in such a broad range of sub-units and programmes such as DRENURBS. There have also been some disadvantages. Municipality protocols limited the capacity to mobilise external stakeholders, especially from other municipalities or State level agencies, although this did begin to happen during the later parts of the project.

The SWITCH approach and results are being institutionalised in a number of ways such as:

- Inputs into the water technical group of the municipal climate change committee.
- Inputs into environmental planning for the 2014 FIFA World Cup (Belo Horizonte is one of 12 cities in Brazil where matches will be played).
- The use of more natural technologies (now a condition for projects to be approved by the Municipal Environmental Secretariat).
- Strengthening the capacity of the Commission for Control of Participatory Budgeting Works to address proposals to the participatory budget.
- Validating and providing feedback with lessons on DRENURBS approaches.

There are still big challenges in scaling up SWITCH concepts within the Municipality. Notably, there is more willingness towards technological change, but not towards more participatory ways of working.

Other opportunities to scale up at institutional level included the SWITCH project’s involvement in the RMBH development plan, and presentations at other municipalities, universities and international events.

Over the latter parts of the project, SWITCH was able to engage with important actors beyond the Municipality and University in the institutional-level learning alliance. During 2010 these bodies provided important channels for further uptake of SWITCH concepts and findings, for example, through an international seminar organised by the state water management agency, IGAM, with SWITCH inputs from other cities including Lodz, Poland.

One lesson is the importance of repeatedly trying to engage organisations. Efforts to engage with the utility COPASA failed many times before staff became aware of a wetland demonstration. They then became interested because they had an interest in using this technology and provided lab support for analysis even after the end of the SWITCH project.

Initially it proved difficult to develop the institutional-level alliance, perhaps because there were fewer concrete activities at this level. However, in 2008 stakeholders were brought together in a new series of activities focused on the development of a long-term vision and strategy for urban water management in Belo Horizonte and these paid dividends.

**Facilitation of SWITCH Belo Horizonte and its learning alliance**

Coordination and facilitation of the SWITCH process was shared between UFMG and the Municipality, with UFMG taking overall responsibility for coordinating the project and the Municipality taking responsibility for facilitation of the learning alliance process. A part-time facilitator was appointed within the SUDECAP department of the Municipality.

Facilitation initially involved introducing the project to existing contacts. Later, more emphasis was put into organising dedicated meetings for all learning alliance members to develop a long term vision and strategy for IUWM. With the local learning alliances, communication through emails, phone calls and face-to-face meetings happened on a frequent, often weekly basis around the demonstration activities. A website was also set up at [www.ehr.ufmg.br/switch/](http://www.ehr.ufmg.br/switch/). Documentation of processes was limited. The facilitator and others in the team made a register of activities but analysis and synthesis of the process, and learning and adaptation, has been difficult. This kind of documentation is rarely done within public offices, as the time, skills and expertise to do so are lacking.

Although the facilitator spoke English, others in her team did not. This language barrier limited the participation of other team members in training and interaction with international network members. A lot of time went into translating supporting documents from the international network.

The 2010 review team felt that more support could have been provided to the facilitation team from the international SWITCH network, with someone to provide backup and feedback on plans and ideas through distance-support and occasional visits.

Conclusions and recommendations

The project developed a balanced mix of research involving faculty and students at UFMG, as well as activities from simple local demonstrations to complex technologies at a sub-basin scale. It undertook networking and information sharing, community education and public awareness raising. SWITCH in Belo Horizonte generated a high level of impact and visibility and its concepts are clearly recognised in the city. Several interviewees said SWITCH is an important ‘brand’ that they need to find ways to continue.

The involvement of both the Municipality and University as partners, and the strong performance of the learning alliance facilitator and city coordinator, were crucial factors in the success of SWITCH providing a balanced set of activities for a wide range of stakeholders.

The team overcame many difficulties, including delays that might have threatened completion of demonstration projects, such as construction of the wetlands demonstration, especially important to SWITCH activities in the city, which was completed in November 2010 only a few months before the project came to an end.

Belo Horizonte has a tradition of engagement in regional/ international networks and knowledge exchange activities and the Municipality’s international relations representative was and is a strong supporter of the SWITCH project approach. To continue to benefit from the lessons, it is important that this book on experiences in all SWITCH cities is made available in Spanish at least, to make it more accessible in Belo Horizonte.

**Acronyms used in this chapter**

COMUSA	Municipal Sanitation Council
COPASA	The utility responsible for providing water and sanitation services in Belo Horizonte
DRENURBS	A programme in Belo Horizonte applying new approaches to urban drainage
IGAM	The state water management agency
IUWM	Integrated urban water management
IWRM	Integrated water resources management
OP	Participatory budgeting
PROPAM	A programme in Belo Horizonte applying new approaches to urban drainage
PROSAB	A network of Brazilian cities working on sanitation
PBH	Belo Horizonte Municipality (Prefeitura de Belo Horizonte)
RMBH Council	Brings together the 33 municipalities of the Belo Horizonte Metropolitan Region
SUDECAP	Superintendency for the Development of the State Capital
SUDS	Sustainable urban drainage system
SMAMA	Municipal Environmental Secretariat
UFMG	Universidade Federal de Minas Gerais

**References**

Smits, S. *et al.*, 2008a. *Governance of urban environmental sanitation: a case from Belo Horizonte, Brazil* (SWITCH Working Paper). The Netherlands: IRC International Water and Sanitation Centre.

Nascimento, N.O. *et al.*, 2007. *Long-term uncertainties and potential risks to urban waters in Belo Horizonte*. In: SWITCH Scientific Meeting 9-10 Jan 2007. Birmingham, UK.

2.5

Public latrines in Old Fadama. (Photo credit: Peter Dicampo)

Ghana



AFRICA

# Learning together makes strategic planning possible for fast growing Accra

By Joep Verhagen, Bertha Darteh, Marieke Adank, Henrietta Osei-Tutu, Philip Sharp and Rene van Veenhuizen<sup>1</sup>

## Introduction

### A rapidly growing city

Ghana is one of the strongest growing economies in West Africa with a per capita GDP of US\$ 2,700. In 2008, an estimated 82% of the population had access to improved water supply, but only 13% of the population had access to improved sanitation facilities (WHO/UNICEF, 2010). Accra is the administrative, political and commercial capital of Ghana and its fastest growing city. Over the last two decades, the metropolis has sprawled beyond the boundaries of the Accra Metropolitan Assembly (AMA) and currently covers what is often referred to as Greater Accra Metropolitan Area (GAMA). Adank *et al.* (2011) estimate that the 2007 population of Accra was 3.4-3.9 million people and that by 2030, the Accra population could be anywhere from 7.5 to 16 million.

### Urban water management in Accra

The main drinking water supply for the city of Accra is provided by the Ghana Water Company Ltd (GWCL). Average production would give 93-106 litres per capita per day (lpcd) depending on population growth, lower than the estimated optimum of 130 lpcd. Based on 2007 data, 59% of the water produced is not sold, because of physical or commercial losses from broken pipes to non-payment of bills.

<sup>1</sup>With contributions by Olufunke Cofie and Liqa Raschid at the International Water Management Institute, Accra.

Just under half of the Accra population do not receive water directly from GWCL, but rely on more expensive intermediate service providers, like water vendors and water tankers. Only about 28% of the poor have a direct connection to the utility system. Low income households use less water than high income households and tend to pay more per unit.

The situation related to excreta and wastewater management in Accra is very poor. Four in ten people rely on poorly managed and expensive public latrines, while 4.3% of the population practise open defecation or use bucket or pan latrines (GSS, 2008). Most excreta collection and treatment facilities are non-functional. A large volume of wastewater is removed from the city through the stormwater drainage system, including the Odaw River which drains into Korle Lagoon, eventually draining into the sea. Solid waste is also dumped in these heavily polluted drains, leading to blockages.

Accra faces serious flooding during the rainy season, threatening lives and damaging property. Many urban poor live in unplanned, informal settlements in low-lying areas, where the majority of flooding occurs, made worse by inadequate drainage and growing urbanisation (AMA, 2006).

Some wastewater is used for urban agriculture; the green parts of the Greater Accra Metropolitan Area produce a large part of the city's fresh food and vegetables. According to Obuobie *et al.* (2006), 800-1,000 farmers earn an income through urban agriculture. In addition, there are an estimated 80,000 tiny productive backyards with any open space being used for vegetables or other crops.

### Water and wastewater governance

Water governance in Accra is fragmented, with overlapping areas of responsibility, but is still highly centralised. Sanitation and wastewater management are largely decentralised. For both water and wastewater, there is poor-to-no enforcement of planning regulations and a lack of integrated planning. Accra is the national, regional and municipal capital and has a complex web of administrative institutions. The Greater Accra Metropolitan Area is divided into eight Metropolitan and Municipal Assemblies, which are responsible for the provision of basic infrastructure and public services:

- The Ministry of Water Resources, Works and Housing (MWRWH) is responsible for setting water policies.
- The Ministry of Local Government and Rural Development (MLGRD) is responsible for the efficient administration of local government. It is also responsible for setting policies on wastewater management and environmental sanitation.
- The Ministry of Finance and Economic Planning (MOFEP) provides the finance to support urban water and wastewater infrastructure.
- The sector relies substantially on donor funds.

### Service providers

Ghana Water Company Limited reports to the Ministry of Water Resources, Works and Housing (MWRWH) and has a five year management contract with Aqua Vitens Rand Limited (AVRL), a Dutch-South African venture. GWCL is only responsible for its customers, not for families who lack a connection to the utility pipelines.

Metropolitan, Municipal and District Assemblies (MMDAs) are expected to promote the construction and use of domestic and institutional latrines, the treatment and disposal of waste, and the management of urban sewerage systems and enforcement, but generally lack resources and trained staff. AMA has a separate sewerage unit responsible for the Accra Sewer Improvement Project (ASIP). Responsibility for drainage is shared between the MWRWH, the Ministry of Roads and Transport, and the Metropolitan and Municipal Assemblies.

### Regulatory agencies

The Public Utilities Regulatory Commission (PURC) is an independent body responsible for the economic and drinking water quality regulation for GWCL water supply services, although it does not formally recognise or regulate secondary and tertiary providers. Water and Sanitation Development Boards set their own tariffs, which are then approved by the respective district or municipal assembly. The Environmental Protection Agency (EPA) is responsible for regulating wastewater discharge, while the Water Resources Commission (WRC) is responsible for regulating and managing the use of water resources.

## The SWITCH approach in Accra

Accra was selected as a SWITCH focus city as one of many cities in sub-Saharan Africa struggling with providing a growing number of citizens, especially the poor, with access to affordable water and sanitation services and to food and income opportunities. Work was already under way by SWITCH partners IWMI and ETC (under the RUAF programme) on the safe use of wastewater for urban agriculture, and opportunities were seen to focus this work on water management under SWITCH. The guiding objective was to deliver a demand led urban water management research programme.

In June 2006, a SWITCH inception team visited a number of organisations involved in water management in Accra and identified a range of problems:

- water leaks, malfunctioning treatment plants and solid waste in drains
- lack of access to safe water and sanitation, especially in poor areas
- pollution of water bodies and the use of polluted wastewater in urban agriculture
- financial constraints, and lack of organisational and staff capacity
- a multitude of institutional issues such as poor enforcement of bylaws, weak organisational links, improper land use, and lack of political will to enforce the 'polluter pays' principle (Morris *et al.*, 2006).

The work package on urban agriculture had already started in Accra, in anticipation of the development of a wider learning alliance, involving a working group on water for urban agriculture, in which members of the multi-stakeholder platform on urban agriculture (AGWUPA) participated, as did a number of other water related institutes. In addition, a range of other potentially relevant SWITCH work packages was identified. However, the demands of the wider project were perhaps not sufficiently attuned to matching research resources to the priority needs of the city stakeholders and a number of the Accra specific problems were not included.

The first city coordinator had to pull out because there was no budget for her time and other resources. At the end of 2006, Prof Esi Awuah, from KNUST in Kumasi, took over this role. At the same time, Bertha Darteh was appointed as a (half-time) learning alliance facilitator. This was very time-consuming, especially as Ghanaians tend to come to meetings only if visited personally. An assistant was appointed, first David Assan, and after July 2009, Henrietta Osei-Tutu. The International Water Management Institute (IWMI) hosted the learning alliance facilitator until the end of 2008, after which she relocated to the newly established “Accra WASH House”, shared by a number of WASH organisation and projects. A SWITCH steering committee was formed to guide the Project in Accra. However, it met infrequently and did not really play a guiding role.

The Accra Learning Alliance was formally launched at the first Accra stakeholders’ forum, on 14-15 March 2007 at Novotel Hotel in Accra. This workshop brought together key stakeholders in urban water management, such as policy makers, regulatory agencies, researchers, consumer groups and representatives from local assemblies – including the Mayor of Accra and the then Minister of Water Resources Works and Housing. During the meeting, stakeholders formulated a common vision for the City of Accra and identified key issues in IUWM that they felt needed to be addressed.

#### Box 2.5.1 Accra Learning Alliance vision for Accra in 2030

In 2030, everyone in the city of Accra (the Greater Accra Metropolitan Area), regardless of economic and social status, will have access to uninterrupted water supply, at an affordable price within a reasonable distance from the house. The water quality of the supplied water will meet Ghana Standard Board criteria. Non-revenue water in the GWCL system, caused by physical and commercial losses, will have decreased to 25%.

In 2030, at least 80% of Accra’s citizens will have access to an acceptable level of sanitation facilities, including flush toilets, KVIPs or good public toilets. Pan and bucket latrines will be phased out. Good sanitation behaviour will be practised by at least 80% of Accra’s citizens. There will be no more open defecation and littering, and hand washing after toilet use will be common practice. People will willingly pay for waste management. This will have led to a 70% reduction in water and sanitation diseases.

In 2030, Accra will be a cleaner city with a well-functioning drainage system. There will be integrated solid waste management (collection, transport, treatment and final disposal) of solid waste in a sustainable way. At least 90% of the solid waste will be collected. The improved collection of solid waste will have eradicated the dumping of solid waste into small and larger drains. The drains will be free from solid waste and pollution of the surface waters and the risk of flooding will have reduced. There will be improved productive uses of water for livelihood (micro enterprises and agriculture), especially through the reuse of stormwater and/or wastewater in urban agriculture.

Table 2.5.1. Key learning alliance (LA) members involved in SWITCH activities in Accra

General LA members	Issues, goals and aspirations
Ministry of Water Resources Works and Housing (MWRWH)	National policy on water related issues/overall responsibility for all water resources and water supply projects
Ministry of Local Government and Rural Development (MLGRD)	National policy on sanitation related issues
Ministry of Food and Agriculture	Policy related to food and (urban) agriculture
Water Resources Commission (WRC)	Management of water resources in Ghana
Ghana Water Company Limited (GWCL)	In charge of urban water supply
Aqua Vitens Rand Ltd (AVRL)	Operator/manager of the urban water supply system for and on behalf of Ghana Water Company
Hydrological Services Department	Stormwater management within cities like Accra
Accra Metropolitan Assembly (AMA) • AMA Sewerage Unit • AMA Waste Management Department • AMA Planning Unit	• Treatment of wastewater/ treatment plant management • Waste management in Accra • Overall planning for the Accra Metropolitan Area
Treatment of wastewater/ treatment plant management	Flood prevention; collection and treatment of wastewater; extending sewerage in remaining unserved low-income areas and reducing downstream impact of the city through pollution
Municipal Assembly (LeKMA)	Planning and waste management in Ledzekuku-Krowor
Environmental Protection Agency (EPA)	Regulation of environmental pollution
Public Utilities Regulatory Commission (PURC)	Regulation of water services by water utilities
Water Research Institute (WRI)	Research on water related issues
Science Technology Policy Research Institute (STEPRI)	Research on policy planning on science and technology issues including water, sanitation and agriculture
Teshie Community	Clients/beneficiaries of water and sanitation services in Accra
Farmers Group (Secretary of Farmers Association)	Users of wastewater in Accra
Ghana Broadcasting Corporation Freelance Journalist of the Ghanaian Times	Media representatives

## Intervention logic

The intervention logic of SWITCH could be summarised as being to:

- Build an inclusive learning alliance to ensure better links between urban water stakeholders and between research providers and users.
- Strengthen and support integrated strategic planning.
- Develop a pro-poor strategic plan based on evidence and supported by a broad group of stakeholders.
- Strengthen the scientific basis for integrated urban water management through applied research that fills local knowledge gaps and provides a basis for improved strategic planning.
- Test and demonstrate the feasibility and potential of selected innovative pro-poor technologies and enhance take up.
- Build local capacity to address priority issues identified by learning alliance members through on-demand training workshops.
- Advocate for an integrated approach towards urban water management through wider sector engagement.

The over-arching objective was to achieve better integration of urban water management through improved links between stakeholders involved in water management in the city, and to identify and develop realistic approaches that can be scaled up and replicated to improve integrated urban water management.

The specific objectives of the Accra Learning Alliance were to:

- bring stakeholders together and improve city level communication
- provide a platform for strategic planning
- improve links between research and practice, ensuring research is demand-led and rooted in the reality of the city, rather than conducting ‘blue-sky’ research.

## SWITCH Accra activities

SWITCH took off in 2007, with the launch of the Accra Learning Alliance and the start of a number of Master of Science (MSc) research theses related to public health risks of the urban water system, urban agriculture and the use of natural systems for the treatment of grey wastewater. Media attention, including interviews on prime-time TV news, helped to get the project known quickly. A visioning and scenario building workshop, led to the Accra Learning Alliance vision for Accra described above in Box 2.5.1 and started a process that developed into strategic planning.

SWITCH conducted research and two demonstration projects to test innovative technologies in relation to urban agriculture, aquaculture and wastewater reuse in Accra and to showcase them to potential users. The working group on urban agriculture guided this work, led by IWMI. Members of this working group had been trained in multi-stakeholder action research, and were involved in the review study and a baseline study (linked to work on social inclusion).

A Resources, Infrastructure, Demand and Access (RIDA) framework<sup>2</sup> was used to compile, review and analyse data and information on water management in the city, including:

- quantity and quality of water resources
- infrastructure related to water supply, excreta and wastewater management and stormwater drainage
- current and future demand
- the actual access citizens of Accra have to these services.

SWITCH contributed to an “Accra starter kit” CD-Rom prepared by IWMI, containing data and information related to integrated urban water management. Learning Alliance members attended training workshops on urban agriculture, urban sanitation and the use of natural systems. Meanwhile, PhD research started and a number of MSc students were involved in the first demonstration project on safe use of wastewater in urban agriculture.

In 2008, a demonstration focused on the use of urine in urban agriculture. MSc research took place on a variety of topics, including the potential of urine as a fertiliser, management of non-revenue water, the use of natural systems for grey water treatment, faecal sludge management and social inclusion.

In 2009, the initial findings from the RIDA analysis, and a subsequent institutional mapping and social inclusion analysis were presented to the learning alliance.

In 2010, the strategic planning process was finalised during a one week workshop, formulating strategic directions for water supply, excreta, wastewater and stormwater management and institutional coordination and integrated planning. A complete picture of the current situation of water management in the city of Accra and strategic directions for the future were presented to policy makers at the SWITCH policy forum. Research was also undertaken on the management of non-revenue water of the Ghana Water Company Limited and on the application of city water balance in Accra.

## Results and discussion

### The Accra Learning Alliance: Bringing urban water stakeholders together

A well-balanced and vibrant learning alliance developed in Accra. This did not happen overnight – it became stronger and better balanced as the project grew and water governance needs emerged. Stakeholders identified closely with being members, attended meetings

<sup>2</sup>Resource-Infrastructure-Demand-Access (RIDA) is an analytical framework to structure water related information. The concept is that users (represented by demand and access) are linked to water resources by water supply infrastructure, and that each of three system elements (resources, infrastructure, users) has its own set of institutions, boundaries and characteristics, that impact on access. Resources is the water available as rain, surface or groundwater; infrastructure is the equipment that is used to get, move, store, treat, and deliver the water (pipes and pumps etc.); demand is based on the number of people and their personal and livelihood demands for water, and access includes barriers to access, coping strategies etc. See chapter 3.5 for more about RIDA.



and workshops whenever possible and took an active part in the functioning of the learning alliance platform itself. The learning alliance has provided a forum for national, regional and local stakeholders to meet and discuss issues in an open manner. Many members know people in other organisations, departments, ministries and stakeholder groups whom they would not have otherwise met. The facilitator built relationships and trust with learning alliance members, and workshops also became an important tool for links and communication.

‘It took some time for stakeholders to engage with SWITCH. The launch of the National Water Policy (February 2008) proved to be a turning point. I studied the water policy document very carefully and found that there are a lot of things that SWITCH wants to do that the ministry wants to do as well. So I listed out the things and I wrote a newspaper article so that people would look at the policy in a different way, and to promote SWITCH. The title of the article was The need for a national dialogue on water. I sent a copy to the Ministry. That is how I revamped my interaction with the Water Directorate. I mentioned to the Director of Water that I would like to discuss how SWITCH could collaborate with the Ministry and he showed interest. I started visiting the ministry every week and it was a very good thing to happen. I usually meet other stakeholders during such visits. They recognise me and they say jokingly: there is SWITCH.’

*Bertha Darteh, learning alliance facilitator*

A number of e-based communication tools were introduced, including a city website ([www.switchaccra.wordpress.com](http://www.switchaccra.wordpress.com)), a stakeholder database and a Google group. However, monitoring showed that most LA members had never or seldom visited the SWITCH website or the city website. Direct communication through face-to-face visits, telephone or email was more effective.

‘SWITCH meetings are different because they carry out follow-ups and monitoring of the workshops and make you feel that you are a real part of what is happening.’

*Richard Oduro, AMA Planning Department*

### High level representation and social inclusion

The Accra Learning Alliance captured high level support. About 30 key stakeholders from the urban water sector and from (local) government attended the 2010 policy forum, including the Chief Executive of Ledzokuku-Krowor Municipal Assembly, the Managing Director of GWCL, the Chief Operations Officer from AVRIL ATMA region, the Acting Executive Secretary of the Water Resources Commission and the Director of Water at the Public Utilities Regulatory Commission (PURC).

‘SWITCH held the stakeholder platform together and provided a discipline of preparing and attending meetings and workshops. The Accra Learning Alliance included wide stakeholder representation from different levels and different sub-sectors.’

*Mr. Minta A Aboagye – Water Director, Ministry of Water Resources, Works and Housing*

However, at regular learning alliance meetings, several Accra member institutions were represented by a variety of junior staff members who had no clear mandate. Discussions were often repeated and it was difficult to make decisions. Representatives of farmer groups and community members from marginalised areas (Teshie) took part in learning alliance meetings and workshops.

‘When I participated in the Accra Learning Alliance at the Erata Hotel for the first time, in June 2009, I was welcomed and the people acknowledged my presence. When we were divided into groups for group work, the people in my group wanted to hear from me, what I thought. I did not feel restricted from participating. But I also listened a lot to the experts. During the meeting we have pushed good ideas. It is now up to AMA, GWCL to make use of this. We now need to monitor that they actually do that.’

*Bukari Fuseni, former secretary of Farmers’ Association*

### Monitoring and process documentation

The learning alliance facilitator monitored the SWITCH learning alliance process, using mini scenarios that served as a checklist of what she needed to do. Process documentation took place through quarterly progress reports on activities of the LA and annual city stories (2007, 2008 and 2009), which were submitted to SWITCH management. Abstracts of the Accra city story were shared with learning alliance members in the form of shorter briefing notes.

### Participatory development of strategic directions

An interesting metamorphosis of the Accra Learning Alliance has been observed as it evolved from a sharing platform into what has become a strategic planning platform. Many key stakeholders consider the development of the strategic directions for water management as one of the key SWITCH deliverables in Accra. The institutional mapping and a social inclusion analysis contributed to a good overview of the current status of water management and water services in the city of Accra. The narrative scenarios were used to test the different strategic options.

'If we do not have a strategy and systems that involve the people in the water issues of Accra, then we will never solve the problems the city is facing.'

*Eng. Charlotte A Engmann – CWSA*

The findings of the RIDA analysis on the current status of water management and water-related services in Accra and projected future developments were intended to serve as input for a working group that would build scenarios and develop strategic plans to achieve the 2030 vision. Despite the best efforts of the facilitator, a working group never materialised. It was difficult to find a convenient time for working group members to meet or time for them to work on something that was not part of their everyday jobs. Most of the work on the vision, scenario building and the development of strategic directions therefore took place at learning alliance meetings and workshops, while data compilation and analysis between workshops was done by a small team from SWITCH consortium members, IRC, KNUST and IWMI.

The strategic planning process resulted in a document presented to the Accra Policy Forum in October 2010 that presented a situation analysis derived from the RIDA, institutional mapping and social inclusion analysis. It outlined the Accra Learning Alliance vision, noted external factors to be taken into account and suggested strategic directions towards achieving the vision.

One of the main recommendations to improve integrated urban water management in Accra was the establishment of a planning and coordination platform, bringing together departments from relevant municipalities with service providers and civil society.

The strategic planning process provided the opportunity for the learning alliance members to get to grips with exploring the real challenges relating to water management in Accra and provide feasible solutions. One interviewee said: "Initially we came up with a lot of fluffy ideas but were soon able to start to focus on the ones we needed to follow up on." The Accra Sewerage Improvement Project was initially perceived as the solution for excreta and wastewater management in Accra. When the Accra Learning Alliance discussed it in a smaller working group in June 2009, they realised it was only a small part of the solution.

#### Box 2.5.2 Accra Scenarios

##### Worst case scenario

Accra in 2030 is a depressing, chaotic and crisis prone town. The population has exploded to more than four times its 2007 population. Water demands are almost six times higher than the capacity of the water supply system in 2007. Lack of effective political leadership, coupled with poor economic performance and severe poverty mean a lack of ability to tackle deep-seated problems of under-investment and poor management of water supply and sanitation infrastructure. These problems are made worse by lack of raw water resources due to increased competition and a reduction in river flows.

##### Medium case scenario

Accra has grown to almost three times its 2007 population, fuelled in part by strong economic performance from oil wealth. This has led to sharply increased demand for water. This demand is augmented by the rapid growth in the tourism and manufacturing sectors. However, this growth has not been chaotic – due in large part to the marked improvement in political culture and related enforcement of planning laws and other regulations. Climate change (and competition for water from outside the city) has led to a modest reduction in overall water resource availability, which together with the strong growth in demand (four times what it was in 2007), presents major challenges. These are compounded by lack of access to finances and land for new infrastructure. However, improved management and capacities within GWCL and local government, new technological options and empowered citizens inspire confidence that solutions will be found.

##### Best case scenario

Accra in 2030 is in many ways a blessed city. The city's population growth, while large, has been manageable (2.2 times 2007 levels). The frequent power shortages of the early 2000s are a distant memory. A sharply improved political culture has led to improvements in enforcement of planning laws, whilst policy is seen as progressive. This, coupled with strong economic growth (partly driven by increasing oil wealth), has led to marked improvements in citizens' willingness and ability to pay for water and sanitation services. Water demands have increased because of steady population growth and economic growth (three times as high as the capacity of the system in 2007). Challenges still exist. Overall water resource availability is reduced. It continues to be difficult to source the necessary financing to upgrade the city's infrastructure and access to land for waste processing facilities and new networks is a constant problem. Nevertheless, there is guarded optimism about the ability of the city to deal with these problems.

**Box 2.5.3 Strategic directions, as explored by the Accra Learning Alliance**

To move from the current situation toward the Accra 2030 vision, the following strategic directions have been explored by the Accra Learning Alliance:

**Water supply**

- Decreasing demand through education, incentives, by-laws and possibly through tariff adjustments.
- Improving GWCL water supply services by:
  - expanding the treatment capacity of the GWCL and exploring additional sources of raw water
  - decreasing physical losses through rehabilitation of the distribution system, better operation and maintenance and active leakage detection, including bulk metering
  - increasing GWCL revenues, through decreasing commercial losses and possibly through increasing the tariff
  - innovative approaches for connecting the poor to the GWCL system
  - acknowledging alternative approaches like standpipes and community-managed bulk water supply.
- Lowering water prices for low income households.
- Improving access to water services for communities and households outside the reach of the GWCL.

**Excreta and wastewater management**

- Improving access to private sanitation facilities by enforcing by-laws, and by appropriate technology choice and awareness raising.
- Improving the quantity and quality of public latrine services.
- Increasing treatment capacity – additional strategies are needed to secure, acquire and maintain sludge treatment sites; rehabilitate existing treatment sites; and to use natural systems.
- Increase the number of connections to the sewer system and improve the capacity of staff.

**Stormwater management**

- Improving stormwater discharge by improving and maintaining the stormwater drainage system and by ensuring drains do not become clogged by solid waste.
- Reducing surface water run-off by applying sustainable urban drainage systems (SUDS), developing and maintaining a green belt around the current built up area, and promoting rainwater harvesting.

**Institutional coordination and planning**

- Facilitation of a Greater Accra Metropolitan Area Integrated Urban Water Management Planning and Coordination Platform for city wide planning alignment and development of water and sanitation services.
- Resolve ambiguities in roles of municipalities and Ghana Water Company Ltd in relation to drainage and wastewater management.

**Research: Filling knowledge gaps for strategic planning**

Initially, research in Accra was based on the identified needs of the members of the working group on urban agriculture, which included farmers, but was not linked to the wider learning alliance. This improved as the SWITCH learning alliance meetings and workshops gave researchers and practitioners opportunities to interact. New research topics became more rooted in a wider range of needs.

For example:

- Other institutes became involved in the development of research and demonstration methodologies on urban agriculture and natural systems for treatment of wastewater.
- The RIDA analysis was done in response to the lack of data and information on water related services in Accra, as identified by researchers and sector practitioners.
- In 2007, faecal sludge management research (through an MSc thesis) identified weak enforcement of sanitation by-laws and lack of a regulatory framework as major problems, and this informed a subsequent SWITCH faecal sludge management training workshop.
- Studies on the wastewater treatment potential of the Kpesie Lagoon showed good potential for treatment of grey water by natural systems and a constructed wetlands.

The results of the RIDA analysis were shared with stakeholders at learning alliance meetings. Stakeholders considered the drafts as a major gift from SWITCH in Accra and findings from the RIDA analysis have appeared in presentations done by AVRIL and the World Bank and were used for proposal development by GWCL.

*‘One really important aspect of the RIDA was the costs analysis along the water supply chain. This was the first time we have seen what the costs of the various modes of supplying water to the community are – right from the network through to tankers and sachets and this has really brought some clarity to the whole debate.’*

*Mr. Minta A Aboagye – Water Director of the Ministry of Water Resources, Works and Housing*

There have been challenges related to communication and coordination, especially as researchers reported to work package leaders (in charge of separate strands of SWITCH work globally) rather than to the city coordinator or learning alliance facilitator. It would have been useful if the learning alliance establishment process had allowed stakeholder analysis and visioning, scenario building and strategic direction development to be done before the research areas were determined.

**Demonstrations: Putting innovation into practice**

The demonstration activities under the work package on urban agriculture took the view that “detailed activities will be identified and defined through participatory involvement of all stakeholders within the learning alliance team” [SWITCH August 2005]. Although this was in line with the demand-led philosophy of SWITCH, it provided a challenge related to the 65% matched funding required for demonstration activities under the SWITCH project, especially since the WASH sector in Ghana is largely funded by international donors.

‘SWITCH could have been a better project than it was if the coordination had been stronger. There was a big issue related to aligning interests of research and the reality on the ground and ensuring that researchers responded to the expectations of the Accra Learning Alliance.’

*Dr. Olufunke Cofie – IWMI*

Two relatively small demonstrations were coordinated by IWMI within the SWITCH framework. These were developed at the Dzorwulu-Roman Ridge, one of the largest urban agricultural sites in Accra, in close cooperation with activities undertaken by the RUAF Foundation on organisational strengthening, access to financing and improved production. The first demonstration tested wastewater risk reduction methods with farmers, who manage ponds to irrigate small plots. A five-pond network was upgraded to protect the livelihoods of farmers while safeguarding public health. Farmers participated in constructing and maintaining steps and simple baffles. The design doubled the water volume, increased water retention from one to two days and enhanced faecal coliform removal (Cofie, 2008).

The second demonstration, part funded and supported by SafiSana Ghana, investigated the potential of collection, storage and use of urine collected from public urinals in Accra (Tettey-Lowor, 2009). In addition to analysis of costs of collection and transport to the farmers’ fields, the demo tested the effect of urine application of different combinations of urine, manure, fertiliser and compost (Cofie, Alugbenga and Amoah, 2010). The application of urine in addition to manure proved to produce the best results. However, there are challenges from salinity. The idea of using urine was welcomed and perception issues of consumers were discussed. Although the demonstration raised the interest of many farmers, uptake of the use of urine on a larger scale has been limited, probably because of problems with salinity, but also influenced by perceived health risks by consumers (Cofie, 2009).

‘The plants cultivated with urine had a better weight and tasted good. I advise others to use urine plus manure. However, the urine is salty. This is a problem in the dry season. I would not use urine on all my beds, especially not in the areas which are salty already. I would not buy urine. Nobody would. ‘Because of my involvement in the SWITCH demonstration and other research, I won the 2008 best innovative farmer award.’

*Mr. Musa Ahmed Ibrahim, urban agriculturist*

‘All farmers from all sites have heard of the SWITCH demonstration. All were invited to see the results. Other farmers asked questions, e.g. about the salt aspect and health aspects. Many of them think we already have a public concern with the coliforms, and the use of urine would even raise public concern further.’

*Mr. Bukari Fuseni, Former secretary of the Dzorwulu urban farmers’ association*

### Sector engagement: Influencing sector discourse

The Accra learning alliance facilitator participated in a large number of sector meetings and events, including the annual Mole<sup>3</sup> conferences organised by the Coalition of NGOs in the Water and Sanitation Sector in Ghana. As more research results emerged, SWITCH gained recognition and the learning alliance facilitator and city coordinator were increasingly approached for input into sector processes related to integrated urban water management.

- The city coordinator and learning alliance facilitator were requested to give input to the World Bank programme identification process, and the facilitator was invited to present the RIDA analysis and strategic directions at World Bank project identification workshops.
- The city coordinator was requested to give feedback on sector policies and to take part in the annual sector review.
- The Chief Executive of the Ledzekuku-Krowor Municipal Authority has requested the learning alliance facilitator and city coordinator to assist them in developing a water master plan.

## Conclusions and recommendations

A strong, inclusive Accra Learning Alliance has improved links and communication between stakeholders in the Accra water sector. The learning alliance provided a good platform for a strategic planning process. At the same time, the strategic planning process enabled the Accra Learning Alliance to go beyond a platform that would be only used for developing and sharing research. Although the process between the learning alliance meetings was less participatory than originally planned, this process has resulted in a highly appreciated situational analysis and strategic directions document.

SWITCH research was only partly successful in responding to knowledge gaps on water management in the city of Accra and providing input to the strategic planning process. Rather than state of the art research on innovative technologies and approaches, the research that has had the biggest impact in Accra has been the collection, compilation and analysis of secondary data on different elements of the urban water cycle, using a RIDA framework. Drafts of this study were widely shared with learning alliance stakeholders for feedback and validation, probably contributing to the widespread recognition and use of the study by stakeholders.

Engagement of SWITCH in the sector changed over time, from seeking opportunities for sharing SWITCH ideas, to being invited to present ideas and findings at various sector forums. This suggests that SWITCH and its ideas are being taken seriously in the urban water sector in Accra.

Stakeholders are keen to take forward initiatives beyond the life of the project, especially the learning alliance which could continue as a strategic planning alliance, and the Strategic Planning Direction Report. There is widespread enthusiasm for the RIDA framework, for data collection and for the strategic planning work and a willingness to continue the platform, in whatever shape needed, beyond the SWITCH project.

**Acronyms and Abbreviations used in this chapter**

AMA	Accra Metropolitan Assembly
AVRL	Aqua Vitens Rand Limited
ASIP	Accra Sewer Improvement Project
CWSA	Community Water and Sanitation Agency
EPA	Environmental Protection Agency
ETC/RUAF	ETC Foundation/Resource Centre on Urban Agriculture and Forestry
GAMA	Greater Accra Metropolitan Area
GWCL	Ghana Water Company Ltd.
ICTs	Information and Communication Technologies
IRC	IRC - International Water and Sanitation Centre
IUWM	Integrated urban water management
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
KNUST	Kwame Nkrumah University of Science and Technology
LA	Learning alliance
LeKMA	Ledzokuku-Krowor Municipal Assembly
lpcd	Litres per capita per day
MLGRD	Ministry of Local Government and Rural Development
MMDAs	Metropolitan, Municipal and District Assemblies
MOFEP	Ministry of Finance and Economic Planning
MWRWH	Ministry of Water Resources, Works and Housing
NGO	Non-governmental organisation
NRI	Natural Resources Institute, University of Greenwich
PURC	Public Utilities Regulatory Commission
RIDA	Resources, Infrastructure, Demand and Access framework
RUAF	Resource Centres on Urban Agriculture and Food Security
STEPRI	Science and Technology Policy Research Institute
SWITCH	Sustainable Water Management Improves Tomorrow's Cities' Health
TREND	Training Research and Networking for Development
UNESCO-IHE	Institute for Water Education, Delft, The Netherlands
SUDS	Sustainable urban drainage systems
WRC	Water Resources Commission

**References**

- Abraham, E. M., van Rooijen, D., Cofie, O. & Raschid-Sally, L., 2007. Planning urban water – dependent livelihood opportunities for the poor. In: Accra, Ghana, SWITCH Scientific Meeting 9-10 Jan 2007. United Kingdom: University of Birmingham.
- Adank, M. et al, 2011. *Towards integrated urban water management in the Greater Accra Metropolitan Area. Current status and strategic directions for the future*. Accra: SWITCH/RCN Ghana.
- AMA, 2006. *Greater Accra – Physical Characteristics, A Public- Private Partnership Programme between Ministry of Local Government and Rural Development and Mks Publications & Media Services*. [Online] Available at: [http://www.ghanadistricts.com/districts/?r=1&\\_sa=30000](http://www.ghanadistricts.com/districts/?r=1&_sa=30000) [Accessed 14 April 2011].
- Cofie, O., 2008. *Improving on-farm ponds for wastewater treatment in Accra, Ghana*. Poster developed as part of the SWITCH Project. Ghana: IWMI.
- Cofie, O., 2009. *Urine in Urban Agriculture in Accra, Ghana*. Poster developed as part of the SWITCH Project. Ghana: IWMI, RUAF, SWITCH, Safi Sana Ltd.
- Cofie, O., Olugbenga, A. & P. Amoah., 2010. Introducing Urine as an Alternative Fertiliser Source for Urban Agriculture: Case studies from Nigeria and Ghana. *Urban Agriculture Magazine: The Role of Urban Agriculture in Sustainable Nutrient Management*, 23.
- Darteh, B., 2008. Accra City Story – SWITCH Project - March 2008. [Online] Available at: [www.switchaccra.wordpress.com/2011/04/30/city-story-line/](http://www.switchaccra.wordpress.com/2011/04/30/city-story-line/) [Access date unavailable].
- GSS, 2002. *2000 population and housing census; summary report of final results*. Ghana: Ghana Statistical Services.
- GSS, 2008. *Report of the fifth round of the Ghana Living Standards Survey*. Ghana: Ghana Statistical Services.
- Morris, M., Adank M., Cofie, F. & Howe, C., 2006. Support Team Visit Report, 26 – 30 June 2006, SWITCH Project.
- Obuobie, E. et al., 2006. *Irrigated urban vegetable production in Ghana: Characteristics, benefits and risks*. IWMI-RUAF-CPWF: Ghana. [Online] Available at <http://www.cityfarmer.org/GhanaIrrigateVegis.html> [Accessed 14 April 2011].
- Tettey-Lowor, F., 2009. *Closing the loop between sanitation and agriculture in Accra, Ghana, Improving yields in urban agriculture by using urine as a fertilizer and drivers & barriers for scaling-up* (MSc thesis report). The Netherlands: Wageningen University and Research Centre.
- Twum-Baah, K.A., 2002. Population growth of Mega-Accra: emerging issues. In: Mills-Tettey, R., & Adi-Dako, K. eds., 2002. *Visions of the City, Accra in the 21st Century*. Ghana: Woeli Publishing.
- WHO/UNICEF, 2010. Joint Monitoring Programme for Water Supply and Sanitation. [Online] Available at <http://www.wssinfo.org> [Accessed 14 April 2011].

<sup>3</sup>In 1989, WaterAid Ghana and partners organised a national conference in the Mole game reserve bringing together policy makers and practitioners in the water and sanitation sector to debate critical issues affecting the sector. The Mole Series, as it became known, has grown in scale and importance and is now organised by the Coalition of NGOs in the Water and Sanitation Sector in Ghana.

# Integrated urban water management planning in Alexandria<sup>1</sup>

Jean de la Harpe, Dr Khaled Abu-Zeid, Mohamed Elrawady and Lama El Hatow

## Introduction

### Water and the City of Alexandria

Alexandria is the city at the end of world's longest river, where it concludes its life-giving journey through ten countries. The Nile represents Alexandria's main source of water, meeting more than 95% of water needs for this Mediterranean city that is home to more than 4 million people; a population that swells to between 6 and 7 million with summer visitors.

At 200 mm per year, rainfall is low but higher than in most parts of Egypt. Of this, some stormwater drains into the Mediterranean Sea without use, while the rest seeps into the coastal groundwater aquifer through the few remaining infiltration areas of the city.

Although most of the city is covered with potable water supply networks, satisfying water demand poses challenging issues: developing water resources; making better use of stormwater and groundwater; managing water demand and allocating water resources for appropriate uses. To these can be added, re-using treated wastewater in line with the National Water Resources Plan, exploring desalination, and protecting waterways and water bodies such as Lake Maryout from pollution.

<sup>1</sup>This chapter is based on assessments in Alexandria in 2008 and mid-2010 with inputs from the learning alliance facilitators, interviews with members of the Alexandria Learning Alliance, and a review of project documentation and main outputs. It draws on material developed by the Center for Environment & Development for the Arab Region & Europe (CEDARE) for SWITCH Alexandria.

# 2.6

Discussing the planned SWITCH demonstration project in Fisherman's Village.  
(Photo credit: Cedare)

## Egypt



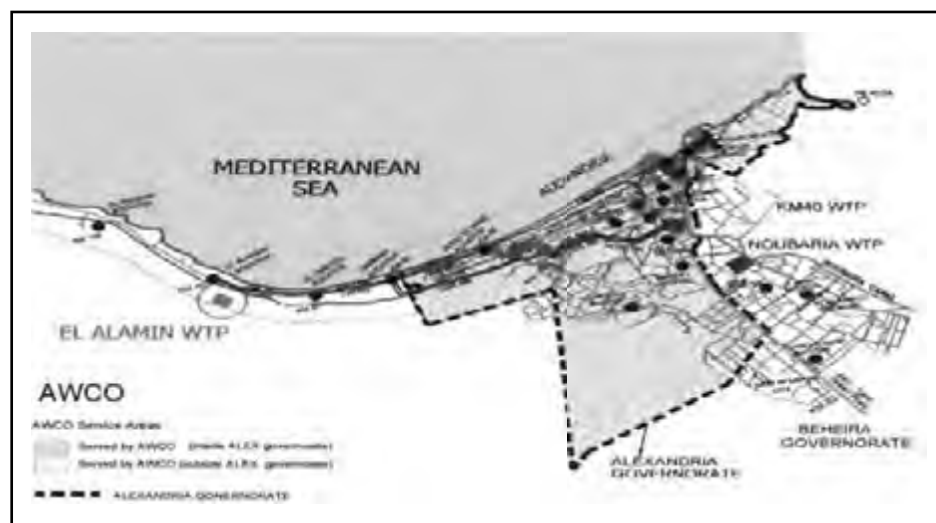
AFRICA



According to official statistics, more than 99% of the inhabitants of Alexandria have access to sanitation, with 80% of the population connected to a centralised sewerage network. Two primary treatment plants are able to cope with 1 million m<sup>3</sup>/day, but this is about 300,000 m<sup>3</sup>/day less than needed, especially in summer with the influx of tourists. To meet the challenge of improving the level of treatment, the number of treatment plants is set to rise to 16. Most of these will be secondary treatment plants. As this will involve a substantial rise in capital expenditure and in operation and maintenance, cost recovery is a major concern. Despite overall high coverage, there are nine low-income, peri-urban areas that remain unserved or under-served by both water and sanitation. There are city and governorate level plans for extending or up-grading services to these areas.

About 40% of Egyptian industry is based in Alexandria including many industries that discharge dangerous wastes into the sewers, increasing the challenge for treatment.

**Figure 2.6.1 Base map of Alexandria Holding Company for Drinking Water (AWCO) service areas**



Source: AWCO

## Enabling environment

SWITCH arrived in Alexandria at an opportune time. The Ministry of Water Resources and Irrigation had produced a National Water Resource Plan as an overall framework for integrated water resource management at national level. Three pilot governorates were identified to determine how the National Water Resources Plan could be interpreted at local level. The Alexandria SWITCH project complements this and a number of other initiatives at city level.

Among these are:

- The 2027 Master Plan for Water Supply for Alexandria and a 2037 Master Plan for Sanitation.
- A plan by Ministry of Housing in cooperation with Alexandria Sanitation and Drainage Company (ASDCO) to enhance the treatment and reuse of sanitary wastewater discharged into water bodies.
- Recognition by the Governorate of Alexandria of the importance of an integrated plan and a willingness to engage in SWITCH dialogues, workshops and the overall planning effort.
- The 'Informal Settlements Development Programme' launched by the Governorate to address the ongoing expansion of 30 informal slum settlements in Alexandria, with a population of approximately 1.36 million inhabitants.
- Strong co-operation between the elected local council and civil society NGOs in Alexandria.

A further enabling factor is the interest taken by international donors in Alexandria's development, leading to the establishment of a coordinating unit for donor activities within the governorate.

## Intervention logic – SWITCH in Alexandria

## Integrated urban water management and institutional challenges

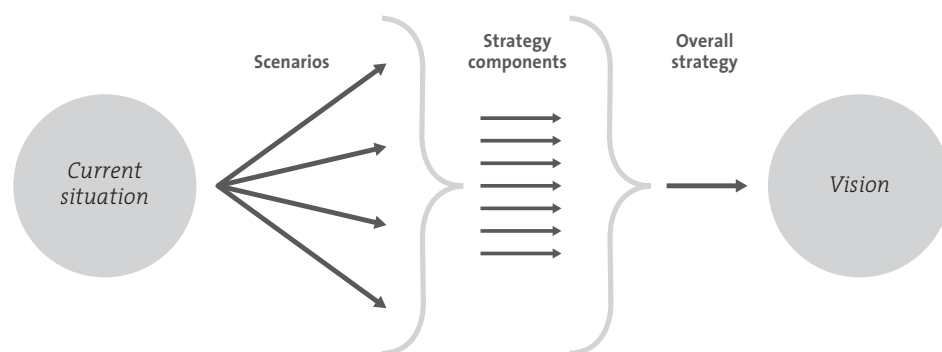
SWITCH was introduced in Alexandria to support its goal to become one of the leading cities in producing and implementing a plan for integrated urban water management (IUWM), as part of SWITCH ambitions for the 'City of the Future'. The project methodology for joint work combines research, demonstration, capacity building and training and the establishment of a learning alliance.

One of the main objectives of SWITCH in Alexandria was to facilitate the production of an integrated urban water management plan which will address current water management and sanitation problems including lack of sanitation coverage, industrial pollution and challenges facing the city water supply. The project worked with stakeholders to develop the plan, generate a common vision and a set of scenarios underpinned with a strong commitment to getting things done. The project undertook nine strategic studies which have been highly praised in the subsequent development of the work. They enabled stakeholders to work together and develop their knowledge and understanding of the issues.

The main planned outputs for the SWITCH project included:

- Future visioning for water resources in the City of Alexandria for the year 2037.
- Strategic studies that explore possible future use of water resources to meet different scenarios.
- Stakeholder analysis and institutional mapping to identify key stakeholders and understand the institutional setting in which approaches and solutions will be adapted.
- Coordination mechanisms between the relevant organisations and stakeholders to establish an Alexandria Learning Alliance.
- An IUWM Plan for the future of Alexandria for 2037.
- A decision support tool ('City Water<sup>2</sup>') to assist in IUWM planning.
- A baseline report on social inclusion in the demonstration site.
- A case study on social inclusion in Egypt and a situation analysis of social inclusion in the water sector in Alexandria.
- A demonstration project to investigate and implement IUWM interventions in an impoverished area in Alexandria, applying social principles to allow a marginalised community to participate in the development process and have their voices heard.

**Figure 2.6.2 Strategy development is based on visioning and scenario building to achieve a shared vision from a range of scenarios; with stakeholders taking the leading role in the process.**



Source: Batchelor & Butterworth, 2008

<sup>2</sup>The City Water model, developed under SWITCH by the University of Birmingham, is capable of assessing the interaction between water supply, wastewater and stormwater. It was developed and tested in part in Alexandria.

As the project proceeded, additional outputs identified by the learning alliance included:

- Transforming the learning alliance into an advisory committee on integrated urban water management to ensure sustainability and to assist the Alexandria Governorate in making water related decisions.
- A framework for the development of the IUWM plan and steps to achieve the institutional coordination and integration necessary to implement it.
- Institutional and capacity building support to institutions that are required to achieve integration.

### How will change come about?

The overall objective of the SWITCH project in Alexandria was to work with the city to produce a plan for integrated urban water management and to begin implementation. This ambitious objective was dependent on achieving the following key components:

**1. The establishment of a learning alliance that becomes formalised and institutionalised as a 'structure for integration' within the governance structures of Alexandria**

A learning alliance was established to bring together key stakeholders from all sectors to disseminate and share information and knowledge, with a longer term aim of promoting a more coordinated way of working to address water challenges. Institutional mapping was conducted to determine relationships between the range of key decision makers in the Alexandrian and Egyptian water sector. Coordination was planned through the learning alliance and through sub-groups set up to work on aspects of the project. A key role has been played by the Center for Environment and Development for the Arab Region and Europe (CEDARE).

**2. Research to support the preparation of an integrated urban water management plan**

The city became a site for developing and testing the City Water information sharing platform. This involved testing scenarios, strategies and options that were being considered for the formulation of the IUWM plan. Eight strategic studies were undertaken, commissioned and conducted by local stakeholders. Communication between learning alliance members improved mainly because of joint work on these studies.

**3. Development of an IUWM plan for Alexandria**

One of the primary objectives of the project was to ensure integrated planning to develop the Integrated Urban Water Management (IUWM) Strategic Plan for Year 2037: A Vision for the Water Future of Alexandria. This plan incorporates the water challenges and needs of all stakeholders from Alexandria. The aim was for the plan to become a guiding document to ensure that the principles of IUWM were incorporated into future planning in the city.

**4. Demonstrating integrated urban water management technical interventions**

The purpose of the demonstration project was to show sector agencies, policy makers and the wider public how improved urban water and sanitation systems could be introduced within an informal settlement – particularly where physical and social conditions are most difficult. This was done to inspire stakeholders to replicate these technologies and scale them up in similar settlements.



## Results and findings

### Alexandria Learning Alliance and stakeholder engagement

The Alexandria Learning Alliance was established with representatives from all relevant sectors in Alexandria: from the Ministries of Housing, Health and Water Resources and Irrigation; Alexandria Drinking Water Company (AWCO); Alexandria Sanitation Services Company; academic research institutes and universities; local NGOs; Alexandria Governorate; and the Environmental Agency of the Alexandria Governorate. The learning alliance held formal meetings every three to four months in the Alexandria Governorate or in Cairo. A total of 15 learning alliance meetings were held during the project timeline.

Learning alliance activities included a visioning workshop, meetings in both Cairo and Alexandria involving water resources assessment and scenario modelling, and a water awareness event. Capacity support included skills training to increase water demand management capacity and the use of advanced software in urban water modelling.

The activities of the learning alliance were managed by a learning alliance facilitator and co-facilitator. In 2008, the Alexandria Company for Drinking Water made an office available for the SWITCH facilitator. Being located within the offices of one of the key stakeholders placed facilitation at the heart of integrating water management at a local level. In 2008, a part-time facilitator was also appointed to work three days a week. The facilitators were supported by several other members of the team from Center for Environment and Development for the Arab Region and Europe (CEDARE), which is the lead SWITCH partner in Alexandria.

Before SWITCH there was no coordinating body. As one researcher said: “Government does not facilitate bringing together stakeholders from different institutions for the purposes of collaboration. SWITCH, through CEDARE, brought together all those with authority to make decisions about integrated water management in Alexandria and facilitated the collaboration, the working together and the whole concept of integrated water resource management.”

### Stakeholders

The Alexandria Learning Alliance categorised stakeholders into primary and secondary groups, where the primary stakeholders were decision makers on water management and part of the learning alliance, and secondary stakeholders were those who acted as intermediaries during consultation.

#### Box 2.6.1 Primary stakeholders in Alexandria integrated water management

- Alexandria Governorate: the leading executive and administrative body of Alexandria.
- Ministry of Water Resources and Irrigation (MWRI): responsible for water resources management in Alexandria (Nile water, surface water, groundwater and rainwater).
- Ministry of Housing, Utilities, and Urban Communities: responsible for water supply and sanitation services in Alexandria. Oversees the National Organization for Potable Water & Sanitary Drainage for Egypt, which covers all governorates in Egypt.
- Alexandria Holding Company for Drinking Water: a sub-branch of the National Organization for Potable Water & Sanitary Drainage. Responsible for ensuring the water supply for the Alexandria area.
- Alexandria Holding Company for Sanitary Drainage: another sub-branch of the National Organization for Potable Water & Sanitary Drainage. Responsible for ensuring sanitation services for the Alexandria area.
- Ministry of Agriculture: responsible for ensuring the optimum allocation, use and development of agricultural resources, particularly land and water.
- Egyptian Environmental Affairs Agency (EEAA): under the Ministry of State for Environmental Affairs, the EEAA ensures the management of natural resources and mitigation of pollution to water, air, and soil.
- Ministry of Health: aims to ensure that drinking water quality meets national and international standards.
- Alexandria Local Council: elected body to represent the people's concerns within the city, including concerns with respect to water-related issues.
- University researchers: researchers who developed the strategic studies and participated in the development of the IUWM plan.

**Box 2.6.2 Secondary stakeholders in Alexandria integrated water management**

- Center for Environment and Development in the Arab Region and Europe: CEDARE is an Inter-Governmental Organisation (IGO) in the region as well as a SWITCH project partner.
- Non-governmental organisations (NGOs): the Egyptian Water Partnership (EWP) focuses on better water resource management in Egypt. Friends of the Environment and Pioneers of the Environment aim at improving water resources in Alexandria.
- Researchers in Alexandria: from the University of Alexandria and the National Institute for Ocean Sciences included experts in hydrology and water resources.
- Fisherman Authority: concerned with possible pollution of Lake Maryout and the use of fisheries.
- Political parties: especially in relation to political concerns in water-related issues.
- Local community: Alexandria citizens and their concerns with respect to water issues.
- Media & lobby groups: and their capability of raising awareness and giving information regarding water resources and conservation.

**The effectiveness of the learning alliance**

Learning alliance meetings were the key forum for communication and building relations, “making a contribution to collecting the opinions of most of the stakeholders and contributing to learning and accessing knowledge”. It also provided a forum where stakeholders could “identify problems and integrate”.

Stakeholders found that the learning alliance facilitated collaboration and data sharing as well as supporting the integrated planning process. One stakeholder commented: “Without the learning alliance we would not have been able to do the work we have done with CITY WATER. The learning alliance provided the platform for accessing data and for promoting urban water modelling.”

Researchers also met outside the learning alliance to share data and increase collaboration. A representative from the ASDCO said: “We are now meeting and coordinating with the water company and sharing information and GIS data. Before SWITCH there was not enough contact, the only meetings that were taking place were to deal with financial arrangements and to discuss water allocations. Now we are discussing and debating integration.” Today, the sanitation company can supply treated wastewater in some places where the water company cannot supply water.

During the 2008 assessment, some stakeholders did not believe that the learning alliance had delivered on its stated aim to deliver a “continuous learning process where different stakeholders with different views are able to engage in real dialogue over their issues of concern”. This perception had changed by 2010, when all stakeholders recognised the value of the learning alliance and its role in facilitating work towards a common outcome. The learning

alliance had shifted from talking to ‘action learning’ as stakeholders worked together to develop the IUWM plan. There seemed to be consensus that this shift came about with the launching of the strategic studies. A number of stakeholders are (post project) using information from the studies.

As the learning alliance became more dynamic, sub-committees were established to deal with different areas of research and a Strategic Planning Team (SPT) was established with the responsibility for preparing the IUWM plan.

Originally, the facilitators were seen as primarily driven by the requirements of the SWITCH project rather than the needs of the alliance members, but this view also shifted. “Commissioning and coordinating the strategic studies has become a major role of the facilitators and these studies [...] will help us to improve what we are doing in our companies”, was one view.

However, some stakeholders complained that there was too much time and too little communication between meetings. Comments included: “When I attend learning alliance meetings, it takes a while to recap where we were at the last meeting”; “Things need to happen in between the meetings to keep our interest”; and “There needs to be more happening here in Alexandria to facilitate contact between us and the work to be done”.

**Sustainability of the learning alliance**

There was still concern in the final year of the project that stakeholders were not sufficiently following up on actions agreed, and that many learning alliance meetings were replaced by meetings of the SPT. This contributed to concerns about what would happen at the end of the project. One stakeholder said: “Without the SWITCH project, the learning alliance will not continue in its current form”.

In August 2008 the project recognised the need to formalise and institutionalise the learning alliance within the governance structures of Alexandria, especially to oversee the implementation of the integrated urban water management plan.

The Alexandria Governorate agreed to set up an advisory committee, to:

- coordinate all sectors concerned with water-related issues
- express an opinion on development projects
- work to achieve integration in the management of water resources in urban areas
- consult on strategies to mitigate the effects of climate change with respect to water
- express an opinion on priorities for projects related to drinking water and sanitation services
- consult on the possibility of increasing the use of non-conventional water resources, especially rainwater harvesting; use of groundwater; desalination of sea water and wastewater reuse.

At time of publication, the learning alliance has not yet been institutionalised within governorate structures. Some learning alliance members take the view that collaboration in future will take place around the plan. One explained that: “Once the IUWM plan is authorised the decision makers from the learning alliance will need to collaborate to implement it and ensure its success. So the plan serves as a focal point for sustainability of integrated urban water management in Alexandria”. However, the IUWM plan has not yet been formalised either.

Many stakeholders have raised the need for a secretariat or support unit to be established within Alexandria to assist the integration process and the advisory committee.

Most stakeholders are concerned about how communication will continue. The Alexandria City website (<http://switchalex.wordpress.com>) was established as a mechanism for disseminating and sharing information regarding the SWITCH project however it has been of limited use as it has not always been kept up to date. The website has remained as a document repository at the end of SWITCH, but there are no resources earmarked to update the website.

### The strategic studies

In mid-2007, a visioning workshop was held where learning alliance stakeholders identified a future city with available water resources, managed in an integrated and participative manner and used effectively for development within a framework of environmental sustainability. These scenarios were considered through a series of strategic studies.

1. The Alexandria Learning Alliance commissioned and carried out nine strategic studies that focused on determining current and future water production as well as an assessment of strategies to decrease unaccounted water. The strategic studies were consistently cited as being one of the most useful and successful outputs of SWITCH to date. All the strategic studies were completed by the end of March 2010. **Wastewater treatment and reuse.** This study formulated strategies to achieve a sustainable urban water system for wastewater management and reuse in Alexandria by the year 2037. The strategies took into account different scenarios in terms of population growth; wastewater flows; wastewater composition; expansion of the sewer system; demand for effluent in industry; urban and agricultural uses; climate change; intrusion of saline water; regulations and effluent standards. The study showed that treated wastewater can contribute about 900 million cubic metres (MCM) yearly that can be used in agriculture, green areas and highway plantation.
2. **Water demand management.** The study suggested three important strategies to make significant amounts of water available by 2037: minimising losses from the pipe network (saving 20 MCM annually by 2037); increasing the drinking water tariff gradually (60 MCM annually); and maximising household water use efficiency (44 MCM annually). The study also discussed institutional and administrative strategies to enhance the Alexandria water sector.
3. **Urban water modelling.** The study developed an urban water model using the Aquacycle software package<sup>3</sup>. It also assessed three strategic alternatives: grey water reuse; roof water reuse and road water reuse which would respectively add 23 MCM, 14 MCM, and 25 MCM annually to water available in Alexandria.
4. **Groundwater potential.** An inventory of wells in Alexandria showed that groundwater could contribute 33 MCM annually to the total water available. A quality profile was

<sup>3</sup>Aquacycle is a daily urban water balance model used to investigate the use of stormwater and wastewater as a substitute for imported (fresh) water. The use of Aquacycle, developed by the Monash University of Australia, was an intermediate step before application of the City Water model.

prepared to identify the location of brackish water. Three strategies were proposed: to use groundwater for irrigating green areas; to use artificial recharge and to desalinate brackish water (see point six below).

5. **Stormwater management.** The purpose was to formulate innovative strategies for stormwater management in Alexandria. However, data was acquired from only one of six weather stations and no concrete evidence on climate change over the past 50 years was revealed.
6. **Desalination.** The study showed that if sufficient funds were available, the amount of desalinated water could reach up to 777 MCM annually starting from 2037. In the shorter term, the study proposed a desalination system that could produce up to 5,000 cubic meters of desalinated water daily.
7. **Nile water availability.** This study confirmed increasing demand in the upstream part of the Nile in Egypt, and the need to find alternative water resources for Alexandria by 2037.
8. **Institutional mapping.** The study identified key players in Alexandria's water sector and found them to be broadly appropriate in terms of implementing the proposed IUWM plan. The study included a review of relevant laws and decrees as well as plans and frameworks such as the 2017 National Water Resources Plan and the 2037 water supply and sanitation plans for Alexandria.
9. **Financial sustainability.** This study identified 'affordable tariffs', defined as the broad ability of a household to pay for water without undercutting its ability to pay for other vital or basic goods and services. The study proposed four tariff graduations that could enhance the financial sustainability of the Alexandria water sector while maintaining affordability.

### Benefits of the strategic studies

Five of the strategic studies have been published<sup>4</sup> and all nine provide input for the IUWM plan. The Alexandria Water Company has agreed to include some of the information from the studies in its Master Plan.

Stakeholders appreciated the practical value of the studies. One said: "It was very valuable to participate in the strategic studies and to solve the problems presented by different scenarios. Because of this research we can make changes to minimise consumption of water in Alexandria. The plan we are developing [...] will solve water shortage problems in arid areas and improve the environment."

The fact that the studies were undertaken by the stakeholders themselves, with the support of international or local experts, was seen by the head of the water company as a major benefit: "Ninety per cent of the actual work was done by our staff. Normally when I need a study, I would bring in someone to do it, but now I know we can do it ourselves. I am very proud of what we have done." Those who conducted the studies also expressed pride in their work. One said:

<sup>4</sup><http://switch.cedare.int/cedare.int/Main.aspx?code=1249>

“It was something completely new to us. I developed nine scenarios in my study and then chose three which I measured from a financial perspective. I found all three were feasible for our company. It has been great opportunity for learning.”

The studies provided valuable new experience, as one stakeholder testified: “Research was new for me. It gave me the opportunity to communicate with other people and to engage with other research. My English improved. I used the SWITCH internet site and I found useful documents such as the cost recovery study. I also emailed the international expert on the team for advice and I learnt how to solve problems myself.”

A stakeholder summed up the experience: “This SWITCH project has increased my knowledge and exposure to so many things. It has created a good thinking environment for me. In the field of wastewater management and wastewater use, it is changing decisions where we are moving towards integrated urban water management.” Another noted: “The studies have brought a focus on outcomes rather than a focus on meetings and reports.”

It should be noted, however, that finding the money within SWITCH for invaluable local research like this was a struggle, at a time when there was no shortage of money available for international research.

### **The Alexandria Integrated Urban Water Management Plan for 2037**

The Alexandria Integrated Urban Water Management Plan for year 2037: A Vision for the Water Future of Alexandria will draw on the various strategic studies and optimise all the options explored in the studies to fill the water-use gap in 2037 without over-dependence on Nile waters.

A strong sense of ownership of the planning process developed during the project and by the end of the project, members of the Strategic Planning Team (SPT) were confident that they would be able to develop a realistic and relevant plan for Alexandria. However, this had not yet materialised at the time of going to press and cannot be considered a done deal.

The SPT consisted of representatives from the Alexandria Water Company, the Alexandria Wastewater Company, the Ministry of Water Resources & Irrigation (MWRI), the Alexandria Water Supply and Sanitation Holding Company, the team leader Dr. Khaled AbuZeid of CEDARE, plus two international water experts and a postgraduate engineer. Two strategic planning meetings were held in 2010. One outcome was to set a timetable and course of action to prepare and draft the IUWM plan by early 2011 for sign off by the Alexandria Governor. The IUWM planning process was ongoing at the time of writing and it was clear that this timetable had slipped.

In the early years of the project stakeholders functioned with separate plans and limited information sharing. The fact that stakeholders were later able to engage in the IUWM planning process is a strong indicator that they had acquired the necessary mandate for integration and joint decision making. One stated: “The core importance of the project is the shared vision for Alexandria’s future water resources where every sector has a part, knowing their contributions and requirements.”

### **Framework for integration**

Successful IUWM planning cannot take place in isolation from the existing planning framework for water at both national and local levels. The challenge of ‘fragmented planning’ was met by the creation of the SPT which provided a framework to guide the planning process in the form of a structured list of contents and through combining the data and strategies from the different studies.

Although the learning alliance had undertaken a successful visioning exercise, stakeholders raised concerns about how to proceed to strategising and planning. For example, the head of the Alexandria Company for Drinking Water pointed out: “Integrated water management at the local level is very complex and is much more than simply putting a plan in place.” Other stakeholders raised similar issues: “What needs to be done on the ground between the institutions to ensure that their work is integrated? A plan cannot answer these questions.”

Stakeholders agreed that the framework towards achieving integration: “should spell out the objectives of our joint efforts, the results we hope to achieve, the activities we must undertake, the deadlines, the timeframes.”

Implementation of the framework requires a high level of political and operational buy-in and support from key institutional stakeholders. This is difficult to accomplish, particularly since integration invariably requires institutions to change the way they plan and make decisions. However, SWITCH in Alexandria created an environment where stakeholders continued to work beyond the end of the SWITCH project towards making the IUWM plan and its implementation a reality.

### **Institutional framework for integrated water management**

An institutional mapping report was produced to address who will ultimately take ownership of the IUWM plan and ensure that it is implemented. In a complex institutional environment, cross-sectoral and collaborative planning and implementation requires both vertical (national to local level) and horizontal (across Ministries) collaboration. The City Co-ordinator and learning alliance facilitators played important roles in forging the links necessary for integration. Since the project ended it has fallen to the key decision makers who developed the strategic studies and IUWM plan to ensure the sustainability of the integration effort.

The promotion of integrated water management at local level by MWRI and the demand for more efficient use of resources has brought about greater collaboration between the stakeholders. However, the institutional arrangements in Alexandria within which integration has to be achieved are complex. There are no existing mechanisms between the MWRI (responsible for water resources planning), the Ministry of Housing and the companies for water and sanitation to facilitate integrated water management planning at local level. Each of these institutions has its own plans and planning arrangements and collaboration means addressing the functional interfaces between these stakeholders and with the Governorate.

In practice, integration requires:

- a common understanding of the roles and responsibilities of each institution
- co-ordinated and aligned planning processes and procedures at operational level
- mechanisms for inter-institutional planning and relations.

“There is passion to achieve the vision and integration. But to be frank, the main challenge is what will happen when SWITCH is not here. I hope that when the project is over, the same passion will still be there. If the passion remains, the project will be a huge success.”

*(Comment by researcher)*

### The demonstration project

The intention was to pilot some IUWM interventions, with special emphasis on providing sanitation services for the poor, wastewater reuse, water demand management and social inclusion in decision making. The site selected in Alexandria is an impoverished area which consists of a fishing village of approximately 1,000 households, close to Lake Maryout. The pilot was to include appropriate technologies and strategies for water sensitive design with decentralised wastewater treatment; water demand management; rainwater harvesting and water reuse. The hope was that findings could be generalised to address integrated water resource management issues for Alexandria.

Figure 2.6.2 Map of the demonstration site location at Ma'awa El-Sayadeen



Source: AWCO

Figure 2.6.3 Map of sanitation services at Ma'awa El-Sayadeen before the demonstration project



Source: AWCO

The main activity of the demonstration project was to improve the network of pipes and sewers and to provide sewer connections to the main and inner streets of Ma'awa El-Sayadeen. Improving the network was not simply a case of extending services, but also finding the right design and construction techniques, particularly in terms of the risks associated with digging and installing pipes in the very narrow inner streets. Alexandria Sanitation and Drainage Company (ASDCO) took full responsibility for the work as their contribution to the project, with SWITCH, through CEDARE contributing a one-time grant.

Figure 2.6.4 Excavation in the narrow inner streets of Ma'awa El-Sayadeen



Source: AWCO

The demonstration project also installed various types of water efficiency devices to highlight different means of reducing water consumption within households, namely: 100 showerhead saving devices; 950 tap saving devices and 1,000 mixer saving devices. Monitoring selected houses showed a 45% average reduction in daily consumption after the devices were installed.

A further demonstration took place at the youth centre using a borehole as an alternatives source for irrigation, to reduce consumption and to keep the youth centre's water bills low when a 50% discount on water bills came to an end. The demonstration also measures groundwater salinity and was designed to test an economic desalination technique.

The demonstration site project was still ongoing at the time of publication. The works had been completed but assessment of their impact was still under way. The project would appear to be heading for some practical successes in terms of demonstrating the potential of water saving devices. It has also drawn attention to a policy contradiction between a Presidential decree which allows the provision of basic services in informal settlements and local bylaws in Alexandria Governorate which require higher service levels.

Social inclusion research was conducted to aid this demonstration activity, with training on methodologies, case studies on best practices and situation analysis. A working visit to slum areas focused on how the demonstration activities can engage and benefit poorer and disadvantaged communities and individuals. This research was supported by the University of Greenwich (UK).

## Summary of lessons learned

### The role of the learning alliance

The learning alliance and the facilitation role provided by the project were key elements towards building collaboration between stakeholders. It took a long time for the learning alliance to move from discussing collaboration to actual joint work. However, once learning alliance members took on tasks and responsibilities they started to act more dynamically between meetings.

IUWM is as much about institutions, local frameworks for governance, organisational responsibilities and capacity as it is about water management techniques. Alexandria presents a rare situation where all the key stakeholders are part of the process and are committed to achieving integrated water resource management for their city.

### Implementation

Delays were an undoubted weakness. For example, concern was expressed by the drinking water and sanitation companies about the short time they had to complete the demonstration project in Ma'awa El-Sayadeen due to the delay in giving the go-ahead for work to begin.

### International exposure and local ownership

Exposure to international experts and experiences was welcomed as a major benefit, especially the team from CEDARE, international experts from SWITCH, and from UNESCO-IHE. Alexandria was keen to participate in the joint cities workshop to share experiences, lessons and strategies, in Zaragoza, Spain, in December 2010.

One local actor reflected: "I was chosen to attend a study tour in Delft and Germany and this informed my thinking about the future of wastewater in the city of the future. I also learnt about... the importance of ecological techniques for treating grey water."

Stakeholders appreciated the opportunity to work with experts. One saw SWITCH as a major capacity building opportunity: "It was very useful to see how Europeans think about water management. Although they don't have the same scarcity of water as we do, they are still thinking about how to save water and translate this into saving money."

However, local expertise in the learning alliance also needed to be respected by the wider project. SWITCH Alexandria was particularly successful in gaining the commitment of water sector specialists who worked together to prepare the IUWM plan. Sometimes they felt undermined by decisions taken at higher levels. One stakeholder commented: "We had cases where we were just told that someone was coming [to work in Alexandria] without even sending us the CV. We need to have a say in who will come and undertake research in our companies."

### Future visioning - a success

For many stakeholders, 'future visioning' represents an exciting process and a SWITCH trademark. One said: "Thinking about the future brought about new and innovative strategies to achieve the vision. We started to look at new concepts such as desalination, using wastewater and ground water and not just relying on the Nile River."

### Role of the strategic studies

The strategic studies were consistently cited as being one of the most useful and successful outputs of SWITCH to date. The studies provided valuable data upon which water management decisions can be taken. Said one participant: "Those who are involved are really committed to the studies and to the IUWM plan because they can see that this work will bring real impact."

### Sustainability of approach

From an institutional point of view the indicators for sustainability are strong. The MWRI is piloting integrated water management at local level with a view to rolling it out to all governorates. The IUWM plan will serve as a 'hub' for key decision makers. The project has buy-in from stakeholders. However it is anticipated that the advisory committee will only become operational once the IUWM plan is in place, and that was not accomplished by the end of the project, albeit that the main actors were still confident that it would happen

The advisory committee is likely to enjoy a high degree of authority and success, especially as the Secretary General of the Governorate and the representatives from the Alexandria Companies for Drinking Water and Sanitary and Drainage have indicated that they expect to benefit from participating. In the context of governance arrangement in Egypt and Alexandria the level of institutional integration achieved is remarkable.

However, it would be a mistake to underestimate the resources and support required. Although the learning alliance was appreciated, such bodies are not sustainable without funds for a facilitator and workshops. Most stakeholders believed that no-one would call a meeting once the facilitators had gone.

## Recommendations

### 1. Quicker implementation

The overall pace of projects like SWITCH needs to be faster. The time taken to consolidate the learning alliance in Alexandria put pressure on the time to produce the strategic studies, the IUWM plan and the demonstration. Stakeholders felt that the SWITCH consortium management put too much emphasis on workings and relationships in the learning alliance, rather than on deliverables. A key decision maker in the learning alliance asked: “Why has it taken so long to do things and to see results? We are all high level experts and respected professions in Egypt and do not have time to sit in so many meetings and not see action.”

### 2. Additional capacity building and training

Opportunities for learning and capacity building need to be built into the project at the beginning. When opportunities did arise, they were greatly appreciated, but water company officials regretted that SWITCH did not provide sufficient capacity building and training around practical skills. The failure to share experiences from other cities was seen as a lost opportunity: “When you have so many international consultants and different experts involved in a project, why can’t you make use of them to also build our capacity?”

### 3. Project finances

Financial flows within the project need to be more predictable for local stakeholders to plan activities and deliverables. SWITCH emphasised participatory processes and the need to obtain the commitment of key stakeholders. There should therefore be a corresponding provision to support major activities recommended by stakeholders and the learning alliance to make integration happen. In SWITCH these seemed to be under-resourced.

### 4. Support to the advisory committee

It is recommended that some means of support is sought to help the Alexandria advisory committee address the institutional challenges to achieving integration in the water sector post SWITCH.

### 5. Role of the facilitating institution

The far-reaching objectives and outputs of the Alexandria SWITCH are not achievable without ongoing coordination and facilitation. At what point can CEDARE withdraw as the driver of the process without putting these objectives at risk?

### 6. Monitoring to address how integration is taking place

Monitoring the success of integration requires the development of targeted indicators. Self-assessment tended to focus on process rather than on than outcomes: indicators for assessing communication focused on the tools without measuring whether they had been successful, while other indicators did not measure the effectiveness of events or the extent to which they met intended objectives.

## Conclusion

SWITCH Alexandria aimed to become a leading city in implementing integrated urban water management based on an IUWM plan developed by all key stakeholders. It is too early to determine how far this will happen. The project has been successful in putting in place the key pillars upon which IUWM can be developed. These pillars include a well-functioning learning alliance, capacity support, research, the IUWM planning process and facilitation and coordination. A critical question, related to some of the recommendations above, is whether the very strong work done on the IUWM will result in a completed plan which is officially sanctioned and becomes a major influence on the future of water collection, use and reuse in Alexandria.

Dr Noha Donia from Ain Shams University concluded in 2010: “Alexandria is a good example of a ‘city of the future’. It is the second largest city in Egypt which urgently needs integrated water management. Through SWITCH we have achieved changes in decision making and we are making changes towards real integrated water management.”

### Acronyms used in this chapter

ASDCO	Alexandria Sanitation and Drainage Company
AWCO	Alexandria Drinking Water Company
CEDARE	Center for Environment and Development for the Arab Region and Europe
EEAA	Egyptian Environmental Affairs Agency
EWP	Egyptian Water Partnership
GIS	Geographic information system
IGO	Inter-governmental organisation
IUWM	Integrated urban water management
MCM	Million cubic metres
MWRI	Ministry of Water Resources and Irrigation
NDP	National Democratic Party
NGO	Non-governmental organisation
SPT	Strategic Planning Team

### References and background documents

- Batchelor, C. & Butterworth, J., 2008. *Learning Alliance Briefing Note 12: Strategy Development (draft)*. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_12\\_Strategy\\_Development.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_12_Strategy_Development.pdf) [Accessed 31 December 2010].
- Butterworth, J. & Morris, M., 2007. *Developing processes for delivering demand-led research in urban water management* (SWITCH Working Paper). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_PAP\\_Developing\\_processes\\_for\\_demand\\_led\\_research\\_in\\_UWM.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_PAP_Developing_processes_for_demand_led_research_in_UWM.pdf) [Accessed 31 December 2010].
- Butterworth, J. & da Silva Wells, C., 2008. *Learning Alliance Briefing Note 7: A framework for monitoring and evaluating project outcomes at city level* (SWITCH Project briefing note series). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_7\\_M\\_and\\_E.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_7_M_and_E.pdf) [Accessed 31 December 2010].
- CEDARE, 2007a. *SWITCH Stakeholder Analysis Report, City of Alexandria, Egypt, October 2007*. [Online] Available at: <http://switch.cedare.int/files28%5CFile2826.pdf> [Accessed 30 March 2011].
- CEDARE, 2007b. *SWITCH Learning Alliance Progress Report Alexandria, November 2007*. [Online] Available at: <http://switch.cedare.int/files28%5CFile2825.pdf> [Accessed 30 March 2011].
- CEDARE, 2007c. Report on Visioning for an IUWM Plan for the City of Alexandria. In: Workshop. Alexandria, Egypt 2007. s.l.: s.n.
- CEDARE, 2010. *SWITCH Strategy Studies*. [Online] Available at: <http://switch.cedare.int/cedare.int/Main.aspx?code=1249> [Accessed 30 March 2011].

# Managing water risks in Birmingham: the city with the tastiest tap water in Britain

By Bertha Darteh, Alistair Sutherland, Jennifer Chlebek, Geoff Denham, Rae Mackay

## Introduction

Birmingham is not only reputed to have the tastiest tap water in Britain, it has plenty of it. For more than 100 years, its main water supply has been from a 118 km pipeline from South Wales, introduced when Birmingham was the engineering capital of Britain. Since then, groundwater exploitation has reduced with the decline in British manufacturing.

Birmingham suffers the problems of plenty. Leakage from the supply and wastewater systems contributes to the city's rising groundwater table and has increasingly posed risks to property. The city is highly developed with mostly impervious surfaces, so when it rains the risk of local flooding increases.

Rising groundwater and flooding carries the risk of contaminating boreholes and rivers that could be used for water supply. These contamination risks are not well understood.

The fragmentation of institutional responsibilities for water management in the UK makes it difficult to coordinate planning related to water and other services, including plans to modernise the city's aging infrastructure.

Birmingham has an effective, centrally managed water supply and a network of sewerage and drainage infrastructure - all of it provided by private companies. In the Midlands area, of which Birmingham is just a part, water is supplied by Severn Trent Water Ltd and South Staffordshire Water Plc. Wastewater services are provided by Severn Trent Water alone.



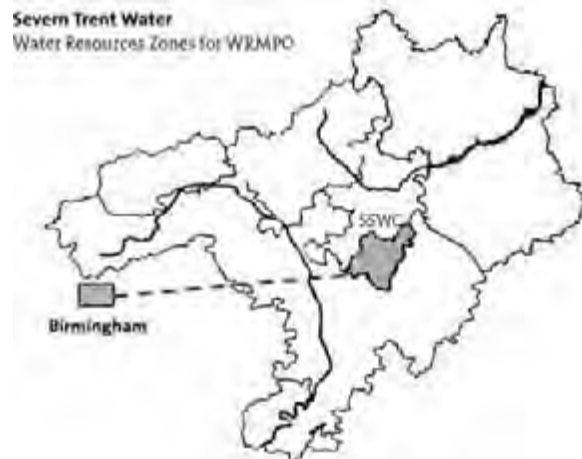
UK

EUROPE

Birmingham



Figure 2.7.1 The water resource zones from Severn Trent Water Ltd with Birmingham shown in grey



Source: Severn Trent Water Ltd, 2010

The current significant water management issues relate mainly to future risks, including climate change, which carries a higher likelihood of intense rainfall. Following extensive flooding in the UK, in 2007, including in Birmingham, there has been increased governmental and local attention to environment management. This resulted in a government inquiry and the Pitt Report (Pitt, 2008) which recommended a 25-year plan to address the issue of flooding, a dedicated government Cabinet committee, better mapping of waterways and an overhaul of building regulations. The Flood Risk Regulations 2009, and the Flood and Water Management Act 2010 place specific duties on local authorities to take the lead in the management of local flood risks and encourage the uptake of sustainable urban drainage systems (SUDS) (Defra, 2010).

Birmingham is currently undergoing extensive regeneration with the current focus being on the Eastside area of the city centre - a 170 acres, multi-million pound scheme designed to increase learning and employment opportunities, create the city's first new park in 100 years, and become an example of best practice in sustainability. The SWITCH project has linked with this revitalisation.

**Box 2.7.1 Key stakeholders in urban water management involved in the SWITCH Birmingham Learning Alliance**

**Birmingham City Council (BCC)** is the municipal development agency responsible for planning and the management of municipal functions including housing, education, social services, biodiversity and governance for the city. The BCC role in the Birmingham alliance was strongly linked to work on planning and implementation of urban regeneration as well as the demonstration of green roofs.

**The Environment Agency (EA)** for England and Wales is responsible for the control of air, land and water pollution; including checking of surface water (quality and quantity), abstraction and discharge, flood management, maintenance of groundwater quality etc. They were involved in the research on stream-aquifer interactions and also on viral transmission in aquifers.

**Severn Trent Water Ltd** is the world's fourth largest privately-owned water company serving over 8 million customers across the heart of the UK. It has responsibility for the provision of water and drainage services for the Severn and Trent catchments – from Bristol to the Humber (including Birmingham) and from mid-Wales to the East Midlands.

**The Consumer Council for Water (CCW)** is the industry watchdog, set up to represent customers of water and sewerage companies in England and Wales.

**Advantage West Midlands (AWM)** is the Regional Development Agency (RDA) for the West Midlands; a governmental organisation that receives funding to support projects in the West Midlands.

**British Waterways (BW)** is a governmental statutory body responsible for the management of inland navigations, the collection of former private waterways and canals that now form part of a national network.

**Chartered Institute of Water Engineers and Environmental Management (CIWEM)** is a professional body that aims to advance the science and practice of water and environmental management.

**West Midlands Centre for Constructing Excellence (WMCCE)** provides specialist business improvement assistance to help local businesses in the construction and building technologies sectors.

**The Office of the Water Regulator (OFWAT)** regulates the performance of water companies.

**Birmingham Environmental Partnership (BEP)** was established in 2008 to mainstream environmental issues, particularly those related to climate-change, into the city planning processes.

# SWITCH in Birmingham

## Project origins and objectives

Birmingham became involved with the SWITCH project through researchers at the University of Birmingham, who were part of the team that put the project proposal together and have been involved in research projects in the city ever since. Rae Mackay, Professor of Hydrogeology at the University of Birmingham became the city coordinator for SWITCH.

The SWITCH Birmingham Learning Alliance was established as the main mechanism for facilitating stakeholder engagement, providing a platform for linking project researchers with the main water sector stakeholders. The learning alliance started to take shape in 2006 through work done by the research team and the learning alliance coordinator, Phil Sharp, an associate director of Arup consultants which steers and facilitates the learning alliance and matches the SWITCH budget. He also acted as learning alliance facilitator up to December 2007, when Jennifer Chlebek (a water engineer at Arup) took over this role. In 2009, Geoff Denham took over as the learning alliance coordinator. Since its inception, there have been two or three SWITCH Birmingham Learning Alliance meetings a year, each attracting 10-15 participants, with a number of ad-hoc meetings between researchers, the facilitation team and industry.

During project implementation, the issues and opportunities forming the main drivers for the planned research and pilot demonstration activities were identified for Birmingham as:

- Rising groundwater table: with the decline of industry, rising groundwater tables are a threat to the subsurface infrastructure of the city. Groundwater quality near the surface is poor and groundwater effluents to the River Tame and its tributaries that pass through the city contain significant organic materials and metals.
- Flash flood risks: changing land use within the city and in surrounding region has increased flash flooding in urban areas, and this appears to be exacerbated by climate change.
- Limited coordination between key institutions: responsibility for urban water management has been split between the water company, Environment Agency, Birmingham City Corporation and a number of other organisations, leading to difficulties in adopting strong policies, best practice and integrated urban water management (IUWM).

These issues have been addressed within the context of a highly centralised and regulated UK water sector, in which private water companies are the main providers and there are fragmented responsibilities for urban water management and difficulties in adopting strong policies, best practice and an integrated approach. Understanding the barriers and incentives that various stakeholders have for engaging with a more progressive urban water management agenda has been part of the SWITCH research agenda.

Although SWITCH globally promoted the concept of demand-led research driven by city learning alliances, in practice the main areas of research were agreed between researchers and individual stakeholders as part of the project design. Stakeholders who joined the learning alliance in Birmingham had limited influence on the main research agenda after the project began.

## Intervention logic

The intervention logic was developed to influence research, planning, stakeholder attitudes and national policy, and was based on the following hypotheses:

1. Improved understanding of the groundwater biophysical and hydrological processes at critical interfaces will contribute to measures which reduce risks from pollution of surface streams by groundwater and assist the identification of opportunities for safe future use of groundwater resources.

Long-term experiments on the River Tame and at the University of Birmingham campus provided critical information to underpin the knowledge required to design appropriate risk mitigation measures for aquifer and river exploitation. This also enabled extrapolation to comparable geo-morphological conditions

2. Alternative urban drainage technologies and wastewater systems will prove to be more sustainable and reduce risks arising from flash flooding. Better models can be developed for assessing sustainability and risk.

'Green and brown roofs' were trialled for their ability to reduce run-off during heavy rainfall and to enhance biodiversity.

An improved integrated model (City Water Balance) to assess the sustainability of the urban water system was developed, with the potential to contribute to planning and decision making in Birmingham and comparable towns and cities.

Combining Geographic Information System (GIS) analysis with extensive stakeholder consultation has the potential to influence and inform future planning frameworks and processes, and technology and product development with regard to managing risks from flash flooding and managing aspects of the urban water cycle.

3. Engaging with the Eastside Regeneration Programme will provide an opportunity to demonstrate the potential of integrated water management and available research.

SWITCH actively engaged with this largest redevelopment of the city centre and provided a forum to keep developers and designers informed about developing sustainable water management practices in what may otherwise have been a business as usual approach.

4. Involving city stakeholders in discussions of the research, demonstrations and future visions of IUWM will lead to research results being more widely and effectively used, and provide a foundation for more integrated planning and management around urban water.

The city learning alliance created conditions for productive dialogue where stakeholders jointly planned activities, shared results more widely and quickly and used local and outside expertise in putting research into use. Visioning exercises brought stakeholders around the table and encouraged longer-term planning around sustainable water management.

5. Public awareness activities and networking will lead a wider sense of the need for a shared vision for integrated and sustainable water management by key city stakeholders.

The SWITCH team in Birmingham engaged in strategic networking, with presentations at key meetings and forums. A website provided a central source of information on the project in Birmingham: <http://switchBirmingham.wordpress.com/>

## Findings and achievements

Following the floods of 2007, national legislation and policy developments provided leverage for SWITCH to influence planning processes in the city and provided a stronger policy framework for multi-stakeholder, longer-term planning around water-related issues. The learning alliance effectively raised stakeholder awareness of the research being undertaken and enabled stakeholders to agree a clear long-term vision for more integrated and sustainable water resource management in Birmingham.

### Research and demonstration activities

Research and demonstration measures under the heading of integrated urban water management were designed to address rising and polluted groundwater, reduce run-off and flooding risks, and so improve the sustainability of the city's drainage and wastewater systems and the quality and sustainability of the urban environment. The University of Birmingham took the lead in coordinating SWITCH research in the city, under the following headings:

#### Sustainable urban drainage systems – green and brown roofs

Birmingham is heavily developed and as a result of densification and urbanisation the city has very little scope for large open spaces. The green roof research and demonstration, led by the University of Birmingham, in conjunction with a number of other interested organisations, has been assessing the ecology and hydrology of various types of green and brown roofs.

**A green roof** is covered with a growth substrate with plants growing on it. Important environmental benefits include thermal insulation of buildings, roof longevity, urban cooling, improved aesthetics, reduced water run-off, and habitat creation for enhanced biodiversity.

**Intensive green roofs** are roof-top parks and gardens, characterised by deep growth substrates, high maintenance and high costs. **Extensive green roofs** are characterised by thin growth substrates, low maintenance and lower costs. The term **brown roof** is used to describe a type of extensive green roof designed to mimic brownfield sites at an early stage of succession. The type of green roof design will influence the environmental benefits.

An experimental array for exploration of different brown roof materials and their impact on biodiversity and urban hydrology was erected on the University campus. Two other brown roof demonstration projects were introduced at the Birmingham Volunteer Service Council (BVSC) and the International Convention Centre (ICC).

Figure 2.7.2a **Brown roof installation trays at the University of Birmingham**



Figure 2.7.2b **Brown roof ecology at the ICC**



A stakeholder pointed to the value of such a demonstration noting: "If it was not for SWITCH we would carry on development as usual [...] You need demos to make people see that they work in practice and not only in theory."

The Birmingham Environmental Partnership, established after SWITCH and focusing on embedding climate change issues into the city's planning processes, has taken up the idea of green roofs. A stakeholder who attended the September 2009 SWITCH meeting on Scenario Planning noted: "Green infrastructure is one of the strongest ways of adapting to climate change in terms of cost-effectiveness. Installing green roofs is one of the ways of dealing with heat stresses; there is a win-win situation if you can deal with it."

A learning alliance member used green roofs as an example of the need for good data to support the development of a policy, and good information to underpin negotiation processes: "I think green roofs are interesting and don't know when the reports will be available but hopefully they will give me an idea of whether you need a green roof policy. For example if we can say [to a developer] you are planning 14 floors, so we will give you 15 floors if you are planning to have a green roof – then everyone wins. We will also need better data to answer the questions about green roofs, like 'Does it prevent flooding?' 'How much water does it hold up?' 'Does it really clean up water?'"

The green roof team at the University of Birmingham has been proactive in wider dissemination of its work and has also integrated green roofs as a teaching resource into the third year geography degree course.

### SUDS steering group and training

Contact between a researcher and city stakeholders at learning alliance meetings led to a steering group for SUDS, involving city planners, the Highways Agency, the Environment Agency, Severn Trent, and Hyder Consulting Group, with data gathering and processing undertaken by Arup. Outputs overseen by this group included a GIS based model (SUDS-LOC) developed by The University of Middlesex Flood Hazard Research Centre which can be used to identify areas where green infrastructure can be included. This technology is being encouraged by Birmingham City Council (BCC) for use in the Eastside regeneration area and has sparked interest from the Environment Agency which has been testing the software in its own offices. A training workshop on best management practice options for sustainable urban drainage was

attended by 15 participants from the learning alliance. The workshop gave an opportunity for learning alliance members to engage with activities in other SWITCH cities and contributors included researchers from Hamburg Essen, University of Birmingham and Middlesex University. It was significant that people paid to attend this training, meaning that they saw its value.

### Eastside regeneration – planning for sustainability

The regeneration project for Eastside in Birmingham city centre had the aspiration to become ‘an exemplar of sustainable development,’ with effective and responsible use of energy, water and waste reduction, and engagement with community and social issues.

In 2002, a visioning study identified a range of redevelopment opportunities and the creation of a new, green, sustainable park.

During dialogue between SWITCH learning alliance members, it was recognised that it would be difficult to achieve the desired exemplar status for Eastside without a master plan or a local development policy that went beyond regulation requirements and a business as usual approach. Members of the learning alliance joined forces to produce a report (Coyne *et al.*, 2008) on issues constraining sustainable development. It highlighted priority actions for utilities infrastructure in Eastside, in order to facilitate a more sustainable solution.

An immediate benefit from the Eastside Utilities Report was that Advantage West Midlands (AWM), the regional development agency, took on a coordination role, initially for power supplies. This enabled key developers to combine efforts in terms of supply applications. Significant cost savings were achieved through an approach which will enable the use of combined heat and power to be incorporated into the utilities’ plans, and which has potential for renewable energy sources (converting biomass and waste to energy). AWM went on to look at a combined, co-ordinated approach for the provision of water, drainage and other utility services and for the planning of services diversions and the incorporation of sustainable drainage systems into planned developments including green and brown roofs. A series of Eastside developer forums were established. This allowed Birmingham to undertake a truly demand-led research project in the context of the SWITCH project. One researcher said that the work done on Eastside was “changing how developers think.”

### City Water Balance

City Water comprises a suite of decision support tools that have been developed during SWITCH. The University of Birmingham has been working on the City Water Balance module of this software which assesses water, energy and budgets across the city as a whole. This allows users to explore a broad range of strategies for future city-level change scenarios on water demand, quality, energy consumption and life-cycle cost.

This software is fully operational and available for download. The management of this software has been taken over by the environmental science consultancy, Ipogee ([www.ipogee.ch](http://www.ipogee.ch)). City Water Balance can be adapted relatively quickly for application in other towns and cities from spatial mapping.

The development of such models requires access to reliable data but researchers were finding this difficult to obtain from Severn Trent Water. One city stakeholder pointed out that Severn Trent has to think on a much wider scale than other SWITCH stakeholders: “The water model from SWITCH does not match what happens in the UK. Here the city is not responsible for its own water.”

The University researcher acknowledged that at first Severn Trent did not have a tangible incentive to collaborate, but when they saw that the tool would be of real value to them they provided the data: “They have nothing to gain – they are not getting paid to give it [the data]. They were more interested once I demonstrated it, at the beginning you have nothing to demonstrate so you have nothing to show, the guys from Severn Trent were quite impressed with the wastewater side when I presented it to them.”

Another stakeholder noted the value of the model for the city as well: “Potentially City Water is a great high-level planning tool for the city authorities. It gives them a chance to play around bearing in mind what might happen in future. For example if we can get useful data we can sit down with planners and see what effect green fields will give. They can see the outputs on whatever decisions are made and there is a basis on which to make every decision.”

The process of developing the City Water model has lessons regarding the SWITCH idea of joint research and planning. Things changed when the owners of the data came to see the potential of the model and this underlines the need for researchers to be proactive in promoting their products. The city learning alliance brokered a confidentiality agreement, underlining the need to have clear safeguards as well as incentives to support collaborative research. However, understanding incentives and the institutional context for uptake is not something that is usually explained or taught to researchers.

The policy and legal framework in the UK, especially prior to recent legislation, was not conducive to engaging city planners in testing and using models like City Water. One of the researchers emphasised the need to get the ‘right people’ involved, but it is important to understand why ‘the right people’ might not be interested and what might make them more interested. If city planners are mostly engaged in shorter-term planning, how does a model like City Water help them?

A further factor is the involvement of key people (champions) within the organisations - respected individuals who are able to commit to a cause beyond the immediate interests of their organisation and who, in this case, opened the door to the data.

### Groundwater research – risks and future uses

The groundwater research was split into two packages each involving the Environment Agency (EA) for England and Wales, the body responsible for the quality of surface and groundwater.

- **Groundwater-surface interactions:** research on the River Tame, a heavily modified watercourse which flows through north Birmingham and crosses the major aquifer beneath the city, has provided further understanding of the natural remediation of pollutants taking place at the river-aquifer interface when groundwater, contaminated by pollutants, enters the stream.

- **Reuse of groundwater:** research has examined the occurrence and mobility of viruses in groundwater and their potential risks to health (Tellam *et al.*, 2007). The aim was to assess the risk to drinking water supplies if treated wastewater is injected into the aquifer. It is important to qualify and quantify such risks before exploitation of underground reservoirs can be carried out.

The outputs of these research packages have applications both within and outside of Birmingham, particularly in countries with a decreasing groundwater supply or where demand cannot be met by current water supplies.

While the research was initially slow in coming out with results, findings provided significant new insights into the dynamics of the river bed and river bank systems. The initial research looked at mixing (turbulent diffusion) at the stream aquifer interface but also made interesting discoveries about the impact of bacteria on the significant levels of gas observed in the river bed. When the river levels rise, compression of this gas lets greater volumes of river water enter the river bed. The storage of groundwater in the river bank (commonly called bank storage) also assists the penetration of river water into the river bed. The mixing of river and groundwater enhances chemical processes that occur in the river bed and improves the removal of many pollutants. The researcher explained: “The research is showing that bank storage should be part of river restoration design as much as river geometry. If we can gain acceptance of this, it is a great step forward.”

While researchers were upbeat about the relevance and potential applications of this problem-oriented research, its immediate impact on city stakeholders was not apparent. Possibly this is because it was addressing longer-term water management issues.

Severn Trent Water funds a research programme linked to its own immediate problems. One representative pointed out that the uptake of research is often a fragmented process and the company has a five year planning cycle: “We are looking at viruses so the work that has been done on viruses can be picked up and used but that is still in the future.”

A further reason may be that the researchers undertaking this research were less actively engaged with other city stakeholders through the learning alliance process. These observations point to the importance of incentives, and perhaps conditionalities, to encourage researchers to make additional efforts to share emerging results with key stakeholders. The city learning alliance offered a platform for researchers, but there was no guarantee that researchers would take advantage of it.

**SWITCH Birmingham Learning Alliance**

Detailed institutional mapping was undertaken by the University of Middlesex to ensure that SWITCH identified and engaged with stakeholders in planning, monitoring and communicating research and demonstration activities. The aim was to identify potential barriers to change and innovation, as well as opportunities for change and drivers of change.

The learning alliance attracted all the key stakeholders with responsibility for urban water in the Birmingham area (see Box 1) and they undertook a number of activities following the SWITCH learning alliance methodology, including:

- visioning and scenario planning
- training activities
- process documentation and monitoring
- dissemination activities.

Through the learning alliance, project leaders in the city effectively raised stakeholder awareness of the research, particularly after the floods of 2007. Subsequent national legislation and policy development provided leverage for SWITCH to influence planning processes in the city and provided a stronger policy framework for multi-stakeholder, longer-term planning around water-related issues.

In the 2008 City Assessment (Darteh *et al.*, 2008), a SWITCH researcher in Birmingham noted: “The difference between SWITCH and other research projects is that we are being more proactive in providing outcomes and information to users in a totally different way than we are used to.”

**Visioning and scenario planning**

A number of visioning workshops and consultations were held to look at the future Birmingham in 2050. The first workshop reviewed three general future scenarios, (old world; new world; and sustainable world) to establish what was currently working well and how water management could be improved in the future. The second workshop concentrated on the visions already available in Birmingham and England, followed by a questionnaire in which learning alliance members ranked key areas of water management. The vision adopted is outlined below.

**Box 2.7.2 A vision for Birmingham in 2050**

Birmingham is a green, clean and vibrant multi-cultural city. We are among the world leaders in terms of water resources, sustainability, environment, economy and development and are seen as an exemplar of sustainable integrated urban water management.

Overall, Birmingham is an economically prosperous city with a strong environmental stance. Birmingham is trailblazing the water resources within their peer group and is seen as a model for other cities in the UK and abroad.

The learning alliance moved on to scenario planning, analysing a number of points in depth. The outcome was three potential scenarios. Two are more pessimistic in terms of climate, energy and population with the third being a more optimistic scenario where Birmingham is flourishing and has embraced innovative water and energy management solutions. The scenarios have been modelled with the City Water Balance to understand the net impact on the water and energy cycle.

### Learning alliance influence on the agenda for SWITCH research and demonstrations

SWITCH provided a unique opportunity for younger researchers to link with stakeholders and communicate the applicability of their research. But some researchers, for example those working on viral transmission, did not manage to build these links. This suggests that city learning alliances may be a necessary, but not sufficient, condition for improving the research-user interface. More compelling factors would seem to be the researchers' need for other stakeholders to provide information or support, or a mechanism for demonstrating the value of the research and policies and planning processes that create demand for certain information or technical solutions.

### Influence on planning

A learning alliance member noted that the way the UK water business is arranged, with different responsibilities and overall control not being in the municipalities, it is difficult to get ownership. The SWITCH city coordinator observed: "If you think back to the time when water [for the city] was first being planned, water was important. That driver is not there anymore because now we have water abundantly – the statutory obligations of Severn Trent and other companies mean planners don't have to bother." He added: "The fact that water providers are not planners is a challenge." For longer-term planning, the Birmingham Learning Alliance played a key role in enabling stakeholders to develop a shared vision of water management for the city's future.

One learning alliance member identified a scenario planning workshop in September 2009 as the most significant SWITCH event in the city: "People recognised that looking forward into the future 50 years is important rather than their constrained planning cycles [...] recognising that the longer-term wins are important, not just the short-term processes."

This effort coincided with establishing a working partnership with Birmingham Environmental Partnership (BEP), which began to influence research and provided a useful uptake pathway for SWITCH ideas to enter into the city's planning process.

One learning alliance representative noted: "We get ideas into the council's framework by doing risk assessments [...] We talk to them and help them to look at how climate change impacts on them and how they prepare for it. In the same way we can look at water shortage. Making an impact on decision making is about being able to embed [research] results, evidence-based planning, and we write strategies for the city."

This alliance member believes that SWITCH researchers needed to be more flexible and make greater efforts to understand city planning perspectives: "SWITCH is looking at the future and councils are looking at a shorter time scale [...] To deal with city council and planners you will have to suppose that they are speaking a foreign language to you, and you have to be able to speak their language."

The learning alliance representative of Severn Trent pointed to the differences in planning horizons between his company and SWITCH: "Making an oil tanker change direction is a slow process. [...] We have a 15 year plan, the first five years gets done, and we review, then change and have another 15 year plan. This does not encourage a longer-term view. OFWAT asked us to do a 25/30 year look forward. This is where the time scale on the things that SWITCH is looking into come into scale."

A stakeholder from the Environment Agency hoped that the scenario planning would lead to action: "I put forward a scenario. I'm expecting someone to come along and say we need an enormous amount of data. A colleague and I should be able to dig out an amount of information for them."

### SWITCH learning alliance influence on stakeholder attitudes and behaviour

After a slow start, SWITCH was relatively successful in bringing the key stakeholders around the table to discuss the future of water management in Birmingham. Two factors are important for this success.

Firstly, the leadership provided by the city coordinator and the learning alliance coordinator and facilitator was crucial. They used their organisational abilities, communication skills and social networks to bring a diverse and initially fragmented group together and over time generate commitment to the idea of a longer term approach to water management. A researcher recalled: "We put up a flag and said, 'this is where we are going, will you go with us?' – some people said 'it is a good idea, we will come along'."

In 2008 it was noted: "A big difference that the LA has made is in bringing stakeholders together in a way they don't usually get to meet. Stakeholders don't usually get an opportunity like this to meet together; to talk of the future of things in a more diverse group. [...] They develop contacts where they can pick up the phone, call and discuss future issues in a more personal manner."

"SWITCH would be a good reference for a point in time where people start to change. The project came at a time when it and other projects were giving major consideration to issues of climate change, urbanisation, population, energy etc. These issues are on the agenda and there is the need for a distinct change in our approach to these matters."

That midterm survey noted the need for the SWITCH legacy to survive the end of the project, with the possibility of the learning alliance being adopted by a 'son of SWITCH' programme.

Since 2008, the influence of SWITCH, mainly through the city learning alliance, has been apparent in the outcomes noted above and in raising awareness, changing attitudes and supportive behaviour.

"On a personal level, I was interested in the wide range of stakeholder views, for Severn Trent it is an eye-opener [...] I went to SWITCH meetings and it made me think of myself as being more traditional. You tend to be defensive [...] what is wrong with how we do this? It is good to have a source of challenge."

*Water company representative*

### Influence on national policy

SWITCH researchers were active in lobbying and advisory work to shape the development of policy and legislation which is more supportive of an integrated approach to water management, particularly the promotion of sustainable urban drainage systems. One researcher said: “With the help of SWITCH, some of the most powerful stakeholders [in England] were involved in the Birmingham LA and they are now aware of the possibilities and solutions for a better future and will have the evidence, and hopefully the conviction, to influence policy in England which itself is in a transition state in favour of IUWM.”

The production of water cycle studies, preliminary flood risk assessments and the establishment of SUDS Approval Boards (SABS) is going to change the city’s relationship with water. It is also going to strengthen relationships between some of the stakeholders that SWITCH brought together. A water company representative admitted that they had become disconnected from local authority planning: “The situation is now changing with the water cycle studies. There are more liaisons. They may not have a SWITCH label but there is a movement towards more cooperation and a more integrated approach to deliver sustainable development... there is some legislation that is pulling us back into statutory planning committees.”

A researcher put the SWITCH efforts into the national context: “Now a lot of things are happening in the UK towards the future and water. There has been a general groundswell. It is difficult to say SWITCH was instrumental. SWITCH was sitting on a wave that would have come to shore anyway.”

### Dissemination, communication and monitoring

The learning alliance worked to disseminate the SWITCH project to a wider audience through presentations and papers at international conferences. The Birmingham Learning Alliance organised a SWITCH session at the European Congress of the International Association of Hydro-Environmental Engineering and Research. In September 2010, a paper on the work of the Birmingham Learning Alliance was presented at the International Water Association (IWA) congress in Montreal. A paper was published on City Water Balance as part of the SWITCH monitor series in Reviews in Environmental Science and Biotechnology (Mackay and Last, 2010).

The Birmingham Learning Alliance website (<http://switchbirmingham.wordpress.com>) was an effective tool for communicating with learning alliance members and others. It acted as a central platform for knowledge sharing, and the website is still accessible to those looking for an overview of the science.

## Conclusions and recommendations

### Lessons learned

“A learning alliance needs to be there before you do action research. But [...] you need some quick wins, short research for a learning alliance to get their teeth in to know what to do. If you want to run a learning alliance as we wanted, [then we should have] agree[d] with the funder a pre-defined work for 18 months and thereafter you can run in the direction that is decided by the learning alliance.”

The idea of bringing stakeholders around the table to identify researchable issues at city level at the start of a five year project appears simplistic. It did not take account of the existing, largely centralised, institutional arrangements, powers and duties relating to water management in the UK. Institutional mapping was done in 2007 under one of the SWITCH work packages but the results were not presented or discussed in the learning alliance. However, it is likely that the results from this institutional mapping did inform the subsequent formulation of new national legislation and policy relating to flood management, which has had a positive influence on stakeholder attitudes towards joint planning activities.

An important conclusion of the institutional mapping exercise was that technology, broadly defined, provides a workable focus for identifying which stakeholders need to work more closely together. This provides a potential basis, whereby researchers can engage with other stakeholders to bring existing and new knowledge to bear on identified problems. As the design of SWITCH implied, interdisciplinary and action-oriented research processes would be needed. Such a model for future research might be more useful than simplistic ideas about demand-driven research.

This implies re-thinking how research projects like SWITCH are designed to include mechanisms for accounting for and rewarding multi-stakeholder processes. A learning alliance member pointed out: “You are relying very much on goodwill and people saying ‘I can fit this into my day’. It is difficult if they don’t have something that they can book their time against.” A researcher observed: “Some people were enthusiastic at meetings and the day after it was forgotten – they went back to their day job.” Future initiatives of this sort require that interdisciplinary research with stakeholders becomes part of the ‘day job’. A further example of this problem was the attempt in 2008 to organise a Young SWITCH meeting with young professionals in the water sector. Although interest was high, securing commitment from organisations to allow staff to work on this outside their daily duties was not possible.

A researcher noted that in the current EU financing mechanism it is difficult to achieve a demand-driven approach: “It would have been good to say we will do this research for the first 18 months, and then the last months will be different [...] 60% of the money could be held in a high interest account to support later developments suggested by the learning alliance.”

Through activities such as the Eastside Utility Study and the work on City Water, Birmingham has tried to embrace the concept of demand-led research. However, some comments from stakeholders pointed to weaknesses in project design:

- The time-frame for SWITCH was too short for a long-term visionary programme.
- Timing was problematic, with research starting before the learning alliances.
- The project model of integration did not fit with centralised UK governance arrangements.
- EU rules about matching funding and accounting made it difficult for researchers to respond to requests for inputs in locations where they did not already have activities.
- Research resources were not well distributed.

It was vital to have strong facilitation and management of the learning alliance to draw people in and keep them there. One of the most difficult activities was sustaining interest in the learning alliance process, particularly in the middle stages. However, key members of the learning alliance were involved in each of the research and demonstration projects, and regular feedback was given. It was not apparent that there was a specific individual driving the SWITCH vision forward in Birmingham. Most of the learning alliance members developed a relatively high level of commitment to a multi-stakeholder platform where issues of shared interest relating to water management could be explored, while a smaller number were enthusiastic.

The project had a number of achievements:

- City Water Balance was used to assess the impact of water and energy management options on future scenarios devised by the learning alliance and is available online for download.
- Dissemination was extensive and included international and national conferences, presentations at professional institutions' climate change groups, similar meetings and gatherings, training and reports.
- SWITCH in Birmingham sits as a stakeholder in a number of other forums such as the Defra Making Space for Water study –and the Midlands Climate Change Adaptation Group, which provided the opportunity for SWITCH Birmingham to influence decision making and promote integrated urban water management approaches.
- The coordinator and facilitator shared SWITCH information on Arup's internal skills forum network. SWITCH was also represented on a number of committees.

## Recommendations

### The overall project

- If a project is demand led, it would be useful to have funds for the added extras that a learning alliance would like to see enacted
- Better communication was needed between SWITCH cities – a yearly global learning alliance concurrent with the scientific meeting would have been advantageous
- Data sharing between researchers and cities needed improvement. Excellent work was carried out globally but it was difficult for other cities to obtain this work and share it with the learning alliance.

### The Birmingham demonstration city

- SWITCH research ended at the same time as the overall project. While City Water Balance will be available as open source software and demonstration projects will continue to promote the green and brown roof concept, it would be better in future, if research ended six months before the end of the project to allow time for the active promotion of products.
- The groundwater demonstration projects needed increased exposure.
- It would have been beneficial to have BCC as a consortium member in SWITCH as opposed to solely a learning alliance member.
- National influence was not achieved in the UK, partly owing to the high number of national bodies within the UK who are responsible for water management. Further efforts should have been made with the Environment Agency and Defra.
- Publicity should have been a higher priority within the learning alliance. There was no media coverage of Birmingham SWITCH research and demonstrations.
- Establishment of Young SWITCH at the outset of the project would have included different views and enabled the future generation to understand IUWM.

### Life post-SWITCH

The work of SWITCH in Birmingham continues beyond the project time frame in a number of ways, primarily through urban planning initiatives such as improved green/blue infrastructure and more holistic planning initiatives. In the latter stages of the project, the learning alliance team (research and facilitation) worked to introduce the SWITCH approach to the wider Midlands area of the UK.

In 2008/9, the Birmingham Water Group was formed which brought together the BCC, the Environment Agency and Severn Trent Water. It is hoped that the ideas from SWITCH will follow through into this newly established group.

In November 2010, a meeting was held on City Water software attended by representatives from BCC, Birmingham Environmental Partnership, the Environment Agency, Coventry City Council and the Consumer Council for Water. All of the parties are keen on using the model and are eagerly anticipating its general release.

SUDS-LOC has the potential to become a nationwide tool given the recent changes in water management in the UK, including the establishment of SUDS Approval Boards (SABS).

The city learning alliance process generated the energy and desire for a longer term engagement around urban water management. However, in the absence of any funded facilitation, there is a question about the extent to which participating organisations will commit resources to such an engagement.



Acronyms used in this chapter

ASR	Aquifer storage recovery
AWM	Advantage West Midlands, the regional development agency
BCC	Birmingham City Council
BEP	Birmingham Environmental Partnership
BVSC	Birmingham Volunteer Service Council
BW	British Waterways
CIWEM	The Chartered Institution of Water and Environmental Management
CCW	Consumer Council for Water
CWB	City Water Balance
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
GIS	Geographic Information System
IAHR	International Association of Hydro-Environment Engineering and Research
ICC	International Convention Centre
ICE	Institution of Civil Engineers
IUWM	Integrated urban water management
IWA	International Water Association
OFWAT	The Office of the Water Regulator
SABS	SUDS Approval Boards
SUDS	Sustainable urban drainage systems
SUDS-LOC	GIS-based SUDS selection tool for urban surface water management
WMCCE	West Midlands Centre for Constructing Excellence
WRMP	Water resources management plan

References

Chlebek, J. & Sharp, P., 2008a. *Birmingham Learning Alliance Stakeholder Analysis Report* [Online] Available at: <http://switchbirmingham.wordpress.com/> [Accessed 25 January 2011].

Chlebek, J. & Sharp, P., 2008b. *Birmingham Learning Alliance Visioning Report* [Online] Available at: <http://switchbirmingham.wordpress.com/> [Accessed 25 January 2011].

Coyne, R., Last, E., Mackay, R. & Sharp, P., 2008. *Birmingham Eastside Utilities Report* [Online] Available at: <http://switchbirmingham.wordpress.com/> [Accessed 25 January 2011].

Darteh, B. et al., 2008. *A mid-term review of SWITCH in Birmingham, its learning alliance and engaging research to address the challenges of integrated urban water management*. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/W6-o\\_CBIR\\_REP\\_Review\\_Birmingham.pdf](http://www.switchurbanwater.eu/outputs/pdfs/W6-o_CBIR_REP_Review_Birmingham.pdf) [Accessed 25 January 2011].

Defra, 2010. *Improving surface water drainage: Implementation of the Lead Local Flood Authority Role under the Flood and Water Management Act* [Online] Available at: <http://www.defra.gov.uk/environment/flooding/manage/surfacewater/index.htm#implement> [Accessed 25 January 2011].

Last, E. & Mackay R., 2007. *Developing a New Scoping Model for Urban Water Sustainability*. In: 2nd SWITCH Scientific Meeting, 2007. Tel Aviv. [Online] Available at: <http://switchbirmingham.files.wordpress.com/2008/02/last-and-mackay-2007-tel-aviv.pdf> [Accessed 25 January 2011].

Mackay, R. & Last, E., 2010. SWITCH city water balance: a scoping model for integrated urban water management. *Reviews in Environmental Science and Biotechnology*, 9, pp. 291-296.

Pitt, M., 2008. The Pitt Review: *Lessons Learned from the 2007 Floods*. [Online] Available at: <http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview.html> [Accessed 25 January 2011].

Severn Trent Water Ltd, 2010. *Water resources management plan, Final version* [Online] Available at: [http://www.stwater.co.uk/upload/pdf/Final\\_WRMP\\_2010.pdf](http://www.stwater.co.uk/upload/pdf/Final_WRMP_2010.pdf) [Accessed 25 January 2011].

Tellam, J. et al., 2007. *Are Viruses a Hazard in Wastewater Recharge of Urban Sandstone Aquifers?* In: 2nd SWITCH Scientific Meeting 2007. Tel Aviv. [Online] Available at: <http://switchbirmingham.files.wordpress.com/2008/02/tellam-et-al-2007-birmingham.pdf> [Accessed 25 January 2011].



The Torre del Agua at the Expo 2008 site. (Photo credit: Zaragoza City Council)

# Zaragoza: taking pride in integrated water management

By Stef Smits, Victor Bueno Bernal and Javier Celma

## Introduction

The city of Zaragoza takes great pride in the way it has managed its water. It has achieved impressive results in reducing water losses and increased investments in wastewater treatment, and has achieved high degrees of participation in water management from citizens, civil society and local government. In 2008 Zaragoza held an Expo with 'water and sustainable development' as its theme. This became the centre of a series of events that heightened public awareness on the need to manage water, and enabled SWITCH to make important contributions.

The city of Zaragoza is the capital of the Autonomous Community of Aragón in north-eastern Spain, with a population of around 700,000. The city has low rainfall, and water for the city has historically been abstracted from the Ebro. Since 2009, the city has shifted its source to the Yesa reservoir high in the Pyrenees.

Zaragoza city embarked on an ambitious initiative to reduce total city water consumption by almost a quarter by 2010. Water scarcity was a concern, as were financial and economic considerations. Water demand management measures were proposed at household level, while the city also aimed to reduce unaccounted for water. Overall, the city more than achieved its target, as household consumption fell from 136 litres per capita per day (lpcd) in 2000 to 105 lpcd in 2009.

### Water governance in Zaragoza

A number significant stakeholder bodies are involved in the governance of water resources or of water supply, where representatives of different bodies or user groups interact.

Spain

EUROPE

Zaragoza

The Ebro River Basin Confederation (CHE) was established in the 1930s to manage the waters of the river basin. User groups, including the Municipality of Zaragoza, are represented on the CHE council, where decisions are made on water allocation and water use tariffs. This was the first agency of its kind in Spain and has acted as a point of reference for river basin organisations inside and outside the country.

The Aragón Water Commission was created in 2004 as a decision-making platform for the Autonomous Community of Aragón, mainly to promote investment in wastewater management.

Water was prioritised as a key area of work in the municipal strategic plan 1996-2010, which included citizen participation in various Agenda 21 Commissions<sup>1</sup> for addressing environmental management. The Municipal Water Commission is a deliberative body providing advice on municipal policies and by-laws and comprises representatives of municipal departments, citizen groups, organised civil society and other stakeholders.

## SWITCH in Zaragoza

Zaragoza has a long experience in addressing problems of integrated urban water management (IUWM) and had moved ahead in areas like water demand management and citizen participation. The municipality was interested in joining the SWITCH partnership, with the aim of becoming a demonstration city.

It was expected that:

- SWITCH would be an opportunity to showcase Zaragoza experiences in urban water management and share experiences with other European cities.
- SWITCH would provide an opportunity to strengthen Zaragoza's water demand management by analysing technical, financial and educational measures and improving them through research and demonstration activities.
- Participating in a European project would be an extra motivation for municipal staff and citizens to continue to address water management and to add new activities.

As Zaragoza already possessed various multi-stakeholder platforms, it was decided not to establish a new dedicated learning alliance, but to use existing platforms for sharing information about SWITCH.

The only SWITCH consortium member was the Ayuntamiento (municipality) of Zaragoza and the core project team was located in its Agency for Environmental Management and Sustainability. This core team was responsible for coordinating SWITCH in Zaragoza with other

1. Agenda 21 is the United Nations action plan for sustainable development agreed by the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. Zaragoza committed itself in the 1990s to a Local Agenda 21 process for addressing local environmental management.

municipal departments, city stakeholders and international consortium members. The Agency had an executive role in the demonstration activities, organising dissemination and awareness-raising activities and directing the research. Staff from other municipal departments were also involved, particularly from the Infrastructure Area, the Treasury and the Municipal Volunteers Corps.

Initially, there was no university or other research partner. The expectation of the Zaragoza municipality was that most research would be technical in nature, while engineering-focused skills were not obvious at the University of Zaragoza. After a year or so, the need to bring research capacity into SWITCH Zaragoza became apparent and discussions were opened. However, two years of attempts to formalise a partnership with the University failed for a number of reasons. In the end the University of Zaragoza carried out work on a topic at the heart of SWITCH but never formally became part of the project.

However, consortium partners from other countries did work with the municipality. The Water, Engineering and Development Centre at Loughborough University (WEDC) collaborated on the technical side of water demand management – a WEDC PhD student did his data collection and case study analysis alongside the demonstration work in Zaragoza. Two Dutch based groups, The Institute for Water Education in Delft (UNESCO-IHE) and IRC Water and Sanitation Centre in The Hague supported the core team on issues of project management and the multi-stakeholder process.

### SWITCH activities

SWITCH carried out demonstration activities in which technical measures were demonstrated in real life settings and research was carried out around them. In Zaragoza the main demonstration was to improve the design of the city's water supply network through a process of sectionalisation – dividing the water supply network into a number of sectors.

Originally the Zaragoza water supply network was a maze with a number of interconnections between parts of the network. This set up has the advantage of creating redundancy - so if there is a burst in a supply pipe, homes can still be supplied through other parts of the network. The main disadvantages are that it is more difficult to detect bursts and leakages and it is more difficult to regulate pressure. Sectionalisation reduces the number of interconnections so that each sector can be seen as a stand-alone network, making it easier to detect irregularities and operate the network. Some redundancy is retained to avoid an entire sector running dry in the event of a pipe burst. Sectionalisation is seen as an important strategy to improve water supply network management and efficiency.

Other areas of research and demonstration were planned to:

- Research and analyse changes in water use as a result of sectionalisation to obtain further insight into water consumption in different parts of the network and better identification of losses.
- Research how different water demand management methods affect water consumption at household level.
- Input the results of work on integrated urban water management into a new municipal by-law on 'eco-efficiency and the quality of integrated water management'.

## Results

Sectionalisation and on-demand management measures were focused in the Actur area of the city, a 1970s neighbourhood with broad lanes, high-rise blocks and 40,000 inhabitants. After a successful test, it was rapidly scaled-up to other neighbourhoods. Sectionalisation was put into place or was studied in almost half of the city. Interviewees appreciated the work on sectionalisation as one of the core activities of SWITCH in Zaragoza and as having some of the biggest added value. Although this had been on the agenda of the municipality for a while, it was SWITCH that provided a broader conceptual framework that encouraged staff at the municipality to think through the sectionalisation approach and triggered them to put it into action. Being a time-limited project, SWITCH also helped to provide this work with deadlines and milestones.

Where the demonstration did not succeed was in moving into a research phase within the SWITCH timeframe. Data on how the sectionalisation is changing the behaviour of the water supply network only started being collected in the second half of 2010. A longer time period is needed to analyse the full effects. It is anticipated these more detailed analyses will still be possible in the future.

### Reflecting on the results

As part of the process of reflection and learning from the project, interviews were carried out in 2010 with a range of people in and around SWITCH in Zaragoza.

A number of difficulties slowed the work in Zaragoza and limited its achievements. For a research project the size of SWITCH, the research results have been somewhat limited, in spite of the high potential.

The core project team consisted of two people, who had a broader set of responsibilities than SWITCH. Under municipal rules it was not possible to hire additional staff, even on a consultancy basis, to carry out the significant amount of work that SWITCH brought in. The core project team was often pressed for time and was not always able to carry out all activities as planned. Difficulties in carrying out the work became more acute when the economic crisis hit Spain and the municipality needed to reduce expenditure.

Delays due to pressure on the core staff and difficulties in making a formal arrangement with the University of Zaragoza contributed to a number of shortfalls, which postponed the benefits of the research beyond the end of the SWITCH project:

- Research on the impact of different types of demand management measures on household water consumption was being finalised at the end of 2010 and specific results could not be assessed before the end of the project. Formally, the results of this work will not be presented under the SWITCH banner even though there was strong collaboration, as the study was carried out by the University of Zaragoza using its own funds.
- The demonstration work on sectionalisation holds the greatest potential for further analysis and research. However, it was only towards the end of the project that a start could be made on in-depth research and analysis on how sectionalisation could help to reduce water losses. The impact of the demonstration project will only be fully appreciated after the end of SWITCH.

- By late 2010, one of the major pieces of PhD research focusing on leakage reduction and energy externalities was still in the phase of processing information and analysis. Again this meant the first consolidated results were only becoming available after the end of the project.

Municipal staff and researchers remain convinced that all three areas of research hold great potential for future use. If results are available in the near future, the municipality and city stakeholders will be in an equally good position to use the results. The disappointment is that SWITCH cannot demonstrate scientific evidence of the benefits of the work done in Zaragoza. However, perhaps more could have been done on documenting and analysing past work on water management in Zaragoza and the results obtained.

Interviewees were broadly positive about the research agenda that SWITCH brought to water management in Zaragoza. Some municipal officials commented that research on sectionalisation or on the analysis of the impact of demand management measures could only happen thanks to a project like SWITCH. The work on demand management has generated discussion on how far to go with such measures, since there is a feeling that current household consumption levels are more or less as low as can be achieved and that further reductions can probably be best achieved by reducing losses in the network or in municipal buildings. The research has stimulated these discussions and it is expected that its final results will substantiate these reflections.

The research on water demand measures allowed the involvement of a wider group of stakeholders, including residents' associations. Some residents' groups were given additional environmental education on water saving measures in the household, which allowed for further involvement in water management at household levels. Some homes and apartment blocks were equipped with digital and remote-sensor water meters. The factory that makes these is based in Zaragoza and donated a large number of meters to the municipality.

### Sharing results

An explicit decision was taken to use existing stakeholder platforms for dissemination and to obtain feedback on research and demonstration activities.

- The Municipal Water Commission is the primary stakeholder platform for the Local Agenda 21 commission. SWITCH presented its overall objective and approach, its specific plans for research and demonstrations and the first emerging results, on a number of occasions. This was also the main platform in the development of the new municipal by-law on eco-efficiency.
- The Aragón Water Commission was not used to share information, as SWITCH focused on the city of Zaragoza rather than on the broader Aragón Autonomous Community. In reflection with the project team, it was felt that this could be a useful platform for sharing lessons from the emerging results with other towns in Aragón.
- The CHE river basin platform was not directly used, as the council of the CHE is a stakeholder body that decides on the distribution of water resources and sets user charges, and is not focused on sharing and disseminating good practice. However, the CHE compiled a water management document that included an overview of water demand practices being employed in Zaragoza, and it is felt that this platform could be a way to share results with other municipalities in the basin.

There have been other opportunities for Zaragoza to showcase its work. Expo Zaragoza 2008 was a platform for sharing experiences with an international audience, as well as local citizens. The Water Tribune, a series of lectures and discussions that lasted for 93 days, included a theme on urban water management to which SWITCH made an important contribution. The intellectual legacy of the Water Tribune is a source of great pride among the people who were involved. Many volunteers recruited for Expo 2008 were given training in sustainable water management and an active group now work as part of the Municipal Volunteers Corps around environmental management and education, including water management. Active NGOs have also emerged, working on issues of sustainable water use.

It is clear that water management has a more prominent place in the community of Zaragoza than in most cities. Two of the most important NGOs in water management in Spain: ECODES and Alianza por el Agua, have their origins and offices in the city. The municipality of Zaragoza, in partnership with the government of Aragón and the national government of Spain, is hosting the United Nations Office to Support the International Water Decade.

### **Institutionalising SWITCH concepts**

The main contribution that SWITCH has made to institutionalising concepts and research findings is in the development of the new municipal by-law on eco-efficiency and integrated water management, which draws together and strengthens a number of existing by-laws dealing with water management. The process of writing this by-law started in 2009 through the Municipal Water Commission as the main stakeholder body. The text includes sections dedicated to management of the water supply network (linked to the sectionalisation work), and conditions for household connections and water saving measures at household level. As this book went to press the final draft of the by-law was awaiting approval by the City Council.

### **International exchanges**

One of the expectations of the Zaragoza project team of participating in this European project was the opportunity to collaborate and exchange with other cities and consortium members. Experiences in this regard were mixed. Various SWITCH consortium partners, from Hamburg, from Latin America, from IRC and Loughborough University (UK) came to Zaragoza. However, learning from other partners and cities remained below expectations, partly because many techniques and approaches proposed from elsewhere were already employed in Zaragoza and partly because language barriers played a limiting role. Zaragoza did appreciate support in project management by other consortium partners, particularly by UNESCO-IHE and IRC.

## **Conclusions**

The Municipality of Zaragoza has experienced more than 20 years of improving water management, and in that sense, there was no apparent need for a major shift in water management. SWITCH was expected to provide an additional impetus to processes already in place and to create synergy with specific water-related initiatives being carried out at the same time, such as the Expo and the establishment of the United Nations Office to Support the International Water Decade.

The 2010 review of the project concluded that:

- SWITCH research in Zaragoza had the potential to contribute to the scientific knowledge base on IUWM, but results were, to date, limited.
- Research on sectionalisation and analysis of the impact of different types of demand management held (and still holds) the potential to yield insights relevant to cities with similar conditions. Local stakeholders were appreciative of this potential and saw SWITCH as providing added value and the impetus to link operations to research. However, the main research components started late and much of the analysis and documentation was not complete by the end of the project.
- There was no a structured and systematic documentation of the Zaragoza experience meaning that an important opportunity was missed to produce to showcase the past experiences of Zaragoza and contribute to the scientific base of IUWM. The municipality is responsible for promoting sustainable water management, but has neither the mandate nor the professional background for research and documentation. Finding a research partner with skills in this field would have improved documentation.
- The sectionalisation approach was successfully demonstrated, was being scaled up well beyond the pilot area and is becoming institutionalised into the municipality's operational management of the water supply system.
- Stakeholder platforms were appropriately used to showcase the work of Zaragoza in sustainable water management, but specific SWITCH experiences were not always visible. Regional and basin level platforms were used only to a very limited extent. Learning from other cities within the SWITCH consortium remained below expectations.
- The new municipal by-law on eco-efficiency and integrated water management seen as one of the most important ways of institutionalising the results of many years of work on water demand management. SWITCH has been one source of input to this.

Zaragoza has a lot to show in terms of past and present water management practices. The SWITCH project was seen by local stakeholders as giving an important impetus to the work on sectionalisation and to research on water demand management measures. Although the actual contributions to research results remained limited, SWITCH proved an additional motivation for municipal officers to improve the use of research data in water supply network operations and to plan water demand management measures.

# Recommendations

Recommendations were made in the first place for the final few months of the project but inevitably most fell outside the SWITCH time frame. Work on addressing some of these issues did begin before the project finished in April 2011. However, follow up after the end of SWITCH depends on stakeholders continuing to pursue this agenda as part of their continuing drive to maintain Zaragoza as a leading city in urban water management.

## Recommendations for objective 1: scientific basis for IUWM

These recommendations carried the highest priority:

- Finalise research activities that started under SWITCH. Specifically continue with the analysis and validation of the research results on the impact of water demand management measures, and start research and data analysis on sectionalisation.
- Consider investing in a more complete documentation of the entire journey that Zaragoza has followed in IUWM. This will showcase the work and help stakeholders in Zaragoza identify areas for further work.
- Define a prioritised research agenda for the future, which could include:
  - possibilities for reducing water losses in industries and in the network
  - tariffs for wastewater treatment and for industry
  - cost-benefit analysis of water demand measures
  - research the potential for wastewater reuse.

## Recommendations for objective 2: demonstration of alternative technologies and approaches

This objective was met. The recommendation was to continue any unfinished sectionalisation. The research agenda should consider more demonstration activities in the future.

## Recommendations for objective 3: support to cross-institutional platforms

Although a lot of effort went into improving links between institutions, not all platforms were fully utilised for sharing SWITCH experiences. Progress was made however, when the Zaragoza team was able to present the SWITCH process and results to the international consortium partners at the conference ‘Sustainable Water Management in Cities: engaging stakeholders for effective change’ held in Zaragoza in December 2010. More could still be done after the end of the project to present SWITCH results in a structured way to existing platforms in the city.

## Recommendations for objective 4: strengthen decision making through plans and policies

The main recommendation under this objective was to promote the final steps towards the approval of the new by-law as an important way to institutionalise the work done.

Recommendations for the medium term included:

- following up the research on water demand management and sectionalisation to include these in a future updated version of the by-law
- promoting and sharing the results of this work to the CHE and Aragón Water Commission, so that the findings can be included in regional water policies and the local water policies of neighbouring municipalities.

These recommendations were made to ensure that the contributions made by SWITCH are taken forward and completed so that SWITCH can fully capitalise on the project contributions to water management of which the officials and citizens of Zaragoza are rightly so proud.

## Acronyms and abbreviations used in this report

CHE	Ebro River Basin Confederation (Confederación Hidrográfica del Ebro)
ECODES	Ecology and Development Foundation
IUWM	Integrated urban water management
IRC	IRC, International Water and Sanitation Centre, The Hague, the Netherlands
lpcd	Litres per capita per day
NGO	Non-governmental organisation
SWITCH	Sustainable Water Management Improves Tomorrow’s Cities’ Health
UNCED	UN Conference on Environment and Development
UNESCO-IHE	Institute for Water Education, Delft, the Netherlands
WEDC	Water, Engineering and Development Centre, Loughborough University, UK

# Hamburg: city with the largest river island in Europe

By Jennifer Chlebek, Bjoern Weber, Jochen Eckart and Jaqueline Hoyer.

## Introduction

Hamburg is one of the most affluent and innovative cities in Europe. It was a founding member of the Hanseatic League that became a powerful trading and mutual protection block from the 14th century, and despite being 100km from the North Sea, it remains one of the world's largest ports. It shares with Berlin and Bremen the distinction of being one of Germany's three 'city states' within the Federal Republic.

In the 1920s, development followed the 'axes concept' focused along radial axes starting at the centre of Hamburg and the space between the axes preserved as farmland or forest. Today, Hamburg is one of the fastest growing cities in Germany, with 1.7 million people living in the municipality, 4.3 million people in the metropolitan region and another 60,000 expected by 2020. This growth puts increasing demands on urban development. Current urban planning objectives include coping with growth, densification, redevelopment of brownfield sites and inner city development.

In the 1990s, Hamburg began to discover the potential of its waterfronts. The core of the city's vision is 'the leap across the Elbe' from the inner city towards the community of Harburg on the southern side of the Elbe River. Wilhelmsburg, the largest river island in Europe, is part of this leap to develop the city's future.

Surrounded by the River Elbe, Wilhelmsburg is the largest of Hamburg's 104 quarters. At the end of 2009 approximately 50,000 people lived on the 35 square kilometre island. Wilhelmsburg is, however, a socially disadvantaged neighbourhood with low income levels, high unemployment, a high ratio of social security benefit recipients and a large migrant population. It is also highly valued by those who live there.

# 2.9

A place for living and working: the Harbour at Wilhelmsburg.  
(Photo credit: Kai Michael Dietrich)

## Germany



EUROPE





A complex system of dykes and pumps regulates water levels for drainage and irrigation. Challenges for development on Wilhelmsburg include protecting the quality of its water bodies, its unique habitats and its centuries old tradition of agriculture. The River Elbe, which makes Hamburg a port, is paramount to the city economy. Tidal changes result in significant sedimentation of the river and harbour, and sea flooding is a constant threat.

Hamburg has a central water supply system and a sewerage system covering over 99% of households and connected to a central sewage treatment plant in the harbour area that ensures a progressive, modern, multi-stage treatment of wastewater. However, the city and Wilhelmsburg face a number of challenges regarding water management.

These include:

- flood risks along the river Elbe and the North Sea
- flash flooding caused by stormwater run-off
- pollution of surface water by industry, agriculture and stormwater
- high and rising groundwater tables
- limited capacity of the existing sewerage system
- using water to develop attractive locations that facilitate high quality housing, increase the quality of life and attract new inhabitants
- development and changing land use.

SWITCH in Hamburg focused its activities on Wilhelmsburg in an effort to influence or intervene in the water-related aspects of these developments.

### Approach and outcomes

Hamburg was a demonstration city in the SWITCH project and it planned to complete demonstration projects as well as influencing future design in Hamburg through research on integrated urban water management (IUWM) and water sensitive urban design (WSUD). During the fourth year, major changes occurred within the project team and this, combined with delays in the plans of outside bodies, meant that the original demonstration projects were not completed. A new team took over in Hamburg with just one year left for the project. Plans were scaled back. What has come out of SWITCH in Hamburg is more limited in terms of outputs, although some of the thinking within SWITCH has helped to inform city thinking.

### Hamburg Learning Alliance

As will be seen below, the learning alliance in Hamburg went through two phases – 1996 to 2009 and then the final year (2010-2011) under new leadership. There was a break in continuity and the second team had to develop plans and activities from a standing start. This disruption set back the ability of the learning alliance to achieve outputs in Hamburg. However, over the course of the five years a large number of organisations and individuals became involved with the learning alliance and took part in its discussions.

In 2007, the learning alliance consisted of a small core involving mainly SWITCH consortium members; the Hafen City University and various departments within the municipality of Hamburg. Initial expansion was made through a formal invitation to key stakeholders, including those involved in citizen engagement, environmental protection, *etc.* The learning alliance represented a range of perspectives, although there was a lack of representation from ethnic

minorities. Over time interest in the learning alliance and attendance at meetings increased. The change in the facilitation team in late 2009 and early 2010, and the resulting lack of activity, reduced the involvement of some stakeholders. Two demonstration projects were cancelled and decisions were not well communicated. The Hamburg Port Authority (HPA) no longer wanted to participate after their demonstration project was cancelled. However, many stakeholders were active in the learning alliance over the course of the project.

#### Box 2.9.1 Stakeholders in the Hamburg SWITCH Learning Alliance

##### Administration

- The State Ministry of Urban Development and Environment Hamburg (BSU)) is concerned with water management and urban planning.
- The BSU – LP (Department of Land Use and Landscape Planning) has overall responsibility for urban and landscape planning in Hamburg.
- The BSU – U (Department of Environmental Protection) is responsible for ministerial and central municipal tasks concerning soil protection, waste management and the protection of water bodies.
- City district authorities, Hamburg Mitte departments of urban planning and civil engineering manage water on a local level under direction of the BSU.
- Landesbetrieb Straßen, Brücken und Gewässer is the public service provider for infrastructure and civil and hydraulic engineering projects, within the municipality, including the 'Leap Across the Elbe'.
- Hamburg Wasser (Hamburg Water) is responsible for managing the sewer system and the water supply for Hamburg including Wilhelmsburg.
- Hamburg Port Authority (HPA) has responsibility for the spatial planning in the harbour area of the island of Wilhelmsburg and for developing an integrated concept for the sustainable development of the River Elbe.
- Four water associations responsible for the management and maintenance of Wilhelmsburg waterways, and Dachorganisation Wasserverbandstag the lead body that coordinates water management and land use associations.
- IBA, the International Building Exhibition Hamburg Inc; IGS, the International Horticultural Exhibition Hamburg Inc., bodies that demonstrate strategies for adaptation to global climate change and Water Sensitive Urban Design.

##### Non-governmental and civil society organisations

- Handelskammer Hamburg (Chamber of Commerce Hamburg).
- Siedlungs-Aktiengesellschaft Altona (SAGA) the public sector housing corporation of the municipality.
- Beirat Wilhelmsburg an urban development committee set up after social unrest in the area 20 years earlier is concerned with urban redevelopment on Wilhelmsburg.
- Society for the Future of the River Island of Wilhelmsburg focuses on the effect of water management for urban planning and the coordination of water related projects.
- BUND Landesverband Hamburg e.V. is part of the nationwide Union for Environmental Protection and Conservation.
- The Society for Ecological Planning.
- Zukunftsrat Hamburg, a consortium of associations, institutions and companies that contribute to the sustainable development of Hamburg.
- Turkish Parents Association, primarily interested in improving educational opportunities, finding jobs, improving language skills and maintaining cultural identity.

##### Research

- Hafen City University Hamburg – Landscape Architecture and Planning conducts research centred on a combination of technical water management problems and urban planning demands.
- Technical University Hamburg-Harburg conducts research about eco-sanitation and co-operated with Hamburg Wasser in the planned demonstration project 'Haulander Weg'.



Intervention logic and activities in Hamburg

The Hamburg SWITCH project was managed by the Hafen City University (HCU) and the State Ministry for Urban Development and Environment (BSU), a sub-division of Hamburg municipality. Each partner provided a city coordinator.

In order to localise the overall SWITCH objective, these partners developed a city-specific intervention logic in 2006, along with a tailored set of activities. The specific objectives were to support sustainable and innovative solutions for urban water management in districts going through an urban transformation process. This required an innovative water management approach that was able to combine new water management techniques with modern urban planning and improve links with other organisations.

Hafen City University undertook research activities to analyse best practice in WSUD and to include it in a demonstration project and facilitated and coordinated the Hamburg Learning Alliance.

Important priorities for the Hamburg team were:

- initiating change towards a more integrated urban water system
- demand led research for integrated urban water management
- scaling up innovation
- empowerment of citizens.

To achieve scaling up of innovative solutions for WSUD two objectives were initially specified:

1. The development of an IUWM plan as a demonstration project on the river island of Wilhelmsburg

The key plan was to produce a water management strategy for Wilhelmsburg, which lies at the junction of the north and south Elbe River and relies on a network of dykes to protect inhabitants from flooding. The island has a high water table and a network of ditches to drain land to the river systems via outfalls and pumping stations. The local drainage boards maintain some of these assets, whilst others are the responsibility of individual landowners.

There is extensive urban agriculture on the island based on traditional farming practices. However, with increasing housing demands, it is important to manage changing land use and ensure sufficient provision for future requirements.

The intervention logic for this period was grouped following four intentions: 1) focus on the local conditions of the island; 2) use the IUWM planning process as a tool of communication; 3) develop a SWITCH demonstration as a contribution towards an International Building Exhibition (IBA) planned for Hamburg in 2013; and 4) learn and share results between researchers, authorities and citizens.

A key learning alliance activity was to produce a strategic plan for IUWM in Wilhelmsburg based on a better understanding of existing assets and dialogue about future risks and needs. The intention was to map assets and produce a plan that would lead to more integrated implementation of solutions in water management for the island.

The learning alliance took the first steps towards developing a water management strategy for the island that would allow planners and developers to plan more holistically and allow people to see quickly what resources were available, what could be improved and what could hinder their developments. The ambition was to highlight innovative solutions to water management problems that would show other cities how it was possible to undertake real change, especially at a time of major regeneration. There was also an aspiration to scale up from Wilhelmsburg to establish the principles of WSUD and IUWM in the municipality of Hamburg as a whole. The planning process would serve as a framework to activate a discussion about the problems of urban water management and to establish a forum to think about innovative solutions.

On the river island, relevant stakeholders were invited to participate in what were planned as five workshops to develop the strategic and IUWM plan. The first two workshops devised a vision for IUWM on Wilhelmsburg in the year 2030 and developed indicators and scenarios based on this vision.

Box 2.9.2 Vision Wilhelmsburg 2030: Make Water Visible

The ‘Make Water Visible’ vision set out to describe a new image of Wilhelmsburg for the year 2030 where several water bodies would be visible and accessible and would serve as attractive locations for recreation, living and working, with and on the water. Beside high quality urban design, the new image of Wilhelmsburg shows an improvement in the quality of water, the ecological quality of surface water and a long-term flood protection strategy. In this vision for 2030, inhabitants of Wilhelmsburg are aware of water demands, are informed about the sustainable water management and identify with the river island. Water is integrated into urban and landscape design and unpolluted watercourses provide habitats for flora and fauna, as well as being used for recreation and for watering gardens when levels in the ditches are sufficiently high. The network of dykes is maintained to ensure adequate flood protection into the future.

The main elements can be summarised as:

- water is an element of urban and landscape design
- water pollution is controlled
- surface waters are connected ecosystems
- sustainable flood protection is in place
- inhabitants are aware of demands on water.

The final three workshops were due to cover data collection, analysis and decision support systems, options for urban water management and reaching agreement on and adopting a city strategy for 2030. However, the process stalled and these workshops were abandoned following the change of the SWITCH city team.

## 2. The implementation of a demonstration project for water sensitive urban design

The scaling up results of the SWITCH project to a wider audience was planned around highly visible demonstration projects taking advantage of major upcoming exhibitions. The initial demonstration project 'Haulander Weg' was planned in cooperation with the International Building Exhibition IBA Hamburg 2013. The IBA had acquired a number of sites on the island to demonstrate sustainable development and best practice, and SWITCH focused on trying to influence one of these projects.

SWITCH assisted the IBA in producing a competition tender for a water sensitive development of 700 apartments, proposed to be the largest ecological demonstration settlement in Hamburg and a showcase for sustainable urban water design. The SWITCH team were involved in preparing the competition brief and it was planned that SWITCH would be on the panel of judges. However, the IBA project 'Haulander Weg' was delayed owing to planning and political difficulties and it was impossible to realise the intended demonstration project within the timeframe of the SWITCH project. Although WSUD principles were retained in the urban planning competition, SWITCH was no longer involved.

To replace this demonstration, a second project was developed in cooperation with the Hamburg Port Authority (HPA), which planned a pilot project for dyke relocation and the development of flooding space at Kreetzand on Wilhelmsburg island. The SWITCH demonstration project planned to supplement the original Kreetzand plan with WSUD strategies. Broadly speaking this would sacrifice land to allow more regular flooding from the River Elbe. However, this demonstration was rejected by the SWITCH international management team. Although the HPA project continued and may include WSUD principles, it continued without SWITCH and this cancellation led to the HPA leaving the learning alliance.

## A break in the continuity of SWITCH in Hamburg

In mid-2009, staff changes at the Hafen City University led to the departure of one of the City Coordinators, along with the City Facilitator. At the same time the other City Coordinator left the municipality and the SWITCH programme. In August 2009, a new team took over, with Prof. Wolfgang Dickhaut as HCU City Coordinator, and Herr Kellner as the municipality SWITCH City Coordinator. Bjoern Weber was appointed the new City Facilitator following a competitive interview process.

As there was no overlap between the teams and most of the new team had not previously been involved, there was a gap before activities recommenced in January 2010. Some events planned for Hamburg had to be cut back.

## Change of tack – the final year in Hamburg

After making an evaluation of the progress of SWITCH in Hamburg, the new team chose to focus on a scaled-down version of the IUWM Plan for Wilhelmsburg. It was agreed to keep the vision but drop the process of scenario building and developing an IUWM plan. The new, more modest, plan was to concentrate on two specific water related issues that are of high relevance for Wilhelmsburg, the water regulation system on the island, and recreation and conservation. Scaling back the interventions meant that the work SWITCH accomplished could not be considered as a demonstration appropriate for the whole of Hamburg. However, it could still tackle locally important issues.

### 1. Water regulation on Wilhelmsburg

Wilhelmsburg has a number of water management issues, including a rising water table, such that the management of water resources on the island is technically and administratively complex. A number of 'Wassergenossenschaften' (drainage boards) are active and hold responsibility for maintenance of ditches and the operation of pumping stations. There are sometimes conflicting demands from stakeholders about desired water levels.

Two workshops were held in June and October 2010 to discuss whether water regulation could be improved and how it could be adapted to allow for the vision to be realised.

The learning alliance as a whole was positive about this plan, although some felt that there was a lack of technical expertise about how to regulate water levels.

A staff member from the City Department of Urban Development and Environment felt that this was a substantial drawback: "It took me years to understand the system and SWITCH didn't understand the complexity. The difficulty with water management in 2030 is to keep it down to earth. The relevancy of visioning and indicators is questionable, the learning alliance discussions are too broad. It would be better to look at a single trench and assess the effect on it in 2030. The problem with this and other projects is that the people working [on it] are not specialists in this area. It would have been good to explore the water conflicts on the island and how to manage these. There is a lot going on the island, and it will be difficult to assess the sole impact of SWITCH."

This stakeholder felt that some of the SWITCH work would have been more relevant had it been started earlier. He was sceptical about the impact given that Wilhelmsburg was also the subject of other development interventions and noted that water management topics were emotive and had led to a fractured relationship between outside organisations and residents.

One citizen representative in these discussion felt that there was a communications gap between 'outsiders' and local people: "The problem is communication - those working here [in the Wilhelmsburg project] are highly educated and cannot relate to the people."

Despite such reservations, the discussions did result in some conclusions which have been put forward for consideration in future development on the island.

**Box 2.9.3 Results and findings from 2010 workshops**

- There are conflicting demands on water levels and regulations between conservation, agriculture and the commercial sector.
- The system of water regulation is so sensitive that an alteration is not feasible, because it would lead to instability of the system.
- Consistency regarding water management should be improved. There are many different projects but little interconnection of effort.
- New existing networks should be used to improve education and information sharing on water related issues.
- Further investigation needs to be undertaken to clarify the effect of water problems in developed areas.

**2. Recreation and conservation on Wilhelmsburg**

The focus was an analysis of environmental conditions of the surface water bodies and the surrounding areas and of the recreational demands by residents and others.

An online and face-to-face questionnaire was produced so that people could map recreational facilities they used and their ideas for the future. An environmental consulting company mapped the accessibility of water. Analysis revealed high recreational demand and a value for water bodies and adjacent areas by people who use them for boating, walking, fishing, swimming or barbecues.

**Discussion and Findings**

In October 2010, a workshop discussed the possibilities of reconciling the demands for recreation and conservation with an integrated approach and well-balanced management.

This workshop concluded that:

- Regulations to restrict recreation activities would be difficult to implement and enforce, but measures to develop recreational water sites would allow conservation areas to flourish in other places.
- Training and information campaigns in schools would encourage children to learn about the importance of protecting water bodies and to take these messages home.
- Recreational uses and ecologic values should be determined for each water body.
- Well-maintained drainage and irrigation is of great importance, especially in an era of climate change when the number and intensity of storms could increase.

It was proposed to convert these findings into project ideas to reflect the idea of integrating and separating recreation and conservation, which could be discussed with funders, politicians and representatives of the municipality.

A number of initiatives were under way before the end of the SWITCH project:

- HCU, the company WasserLand and other key stakeholders were working on raising funds to realise 'Wasserkulturförderung' (the water culture concept).
- HCU, SAGA and other organisations met representatives of the International Horticultural Exhibition to discuss funding and to activate some project ideas.
- As a direct follow up of the SWITCH work in Hamburg, HCU began to collaborate with the municipality on the possibilities and challenges of decentralised stormwater management in urban planning.

**Research under Hamburg SWITCH****Water sensitive urban design research for improvements in the application of decentralised stormwater management**

Water sensitive urban design (WSUD) supports the idea that stormwater management needs to be integrated with urban design and seeks to combine the functionality of water management with principles of urban design. Decentralised solutions for sustainable stormwater management have been developed and legislation has been advanced. However these systems are often under-utilised and recognition of their merits is quite low. One reason is that stormwater facilities have often been engineered without considering the ecological, social, or aesthetic qualities, which influence public perception and acceptance.

Research has included defining WSUD, examining the principles involved in its use and analysing a number of case studies in Germany, Holland, Poland and the USA. This research resulted in a manual on WSUD (Hoyer *et al.*, 2011). This has the potential to promote WSUD principles widely and is a significant output from SWITCH.

**Eco-sanitation**

Two activities aimed to promote the change from conventional sewer systems to eco-sanitation solutions. The Technical University Hamburg-Harburg Institut für Abwasserwirtschaft und Gewässerschutz (AWW) undertook research on both low tech and high tech eco-sanitation, promoting source separation as soon as possible within the drainage system. Within SWITCH, AWW investigated nutrient recovery, fertilisers from urine and waterless toilets for application both to the developed and developing world. They also investigated, outside SWITCH, closed loop systems including treatment of wastewater (blackwater) within the home and using recycled water to flush toilets.

Three members of the learning alliance had planned a demonstration project for eco-sanitation in the Haulander Weg project that was subsequently cancelled. They also worked alongside Hamburg Water on a separate project, investigating "closed loop" systems whereby blackwater is extracted via vacuum toilets and is used for nutrient recovery and combined heating and power. Although the demonstration project for eco-sanitation was not formally integrated into learning alliance activities, it was done by members of the learning alliance using results from SWITCH research.

## Perceptions of changes in the project

A mid-term review undertaken in 2008 and another taken in the final year (2010), led to some lessons and conclusions. These were based on the experiences of the city co-ordinator and the facilitator, and views and comments collected from a selection of learning alliance members.

The views of those who were involved in SWITCH prior to 2010 were polarised depending on their role. Those who were at the centre of the project, such as the municipality and others in the alliance, thought the process reasonably well managed. “It didn’t matter that there was a gap, the same people participated and there was continuity in the themes”, said a learning alliance member from BUND Landesverband.

However, those who had been involved in plans for demonstration projects felt let down. A learning alliance member from the Ministry of Urban Development and Environment (BSU) said: “We were disappointed to find that the demonstration money was withdrawn. Although the planned demonstration project was not possible, the funds could have been used to fund another project [Kreetsand]. This project will go ahead without SWITCH, but the lack of SWITCH funds will result in it taking longer.”

Others, such as the Port Authority, were not keen to re-connect with SWITCH because of the removal of SWITCH funds for the demonstration in which they had an interest.

Prof. Dickhaut, who took over as City Coordinator in 2009, would have liked to have worked more intensively on demonstration projects, but found that the time was too short to work with other consortium members or to engage fully with the SWITCH team globally. He felt that the work had been too theoretical with too little time spent influencing concrete projects.

## Conclusions

### Lessons learned

A number of lessons from SWITCH in Hamburg are potentially transferable to other cities involved in similar projects and the wider community thinking about water management.

- **Realistic targets:** SWITCH promised demand-led research. However, much of the project was determined before start up. Lack of flexibility at global level denied demonstration funds for an alternative project when the first demonstration was cancelled.
- **Change management:** It is important to inform people of changes in personnel and project development. The new SWITCH Hamburg team seized the opportunity in inviting learning alliance members to come together in late 2009/2010 to review the direction of SWITCH but the transition was not as smooth as it might have been and there was a long period of inactivity. The new facilitation team was torn between trying to re-establish the learning alliance and working with other cities. In hindsight, attendance at another city’s learning alliance or another city facilitator sitting in during a Hamburg meeting, might have been beneficial.

- **Exemplar city:** The Hamburg Learning Alliance was very proud of its stakeholder engagement programme for new development and research projects, and found that much of ‘innovative’ thinking in SWITCH was old news for Hamburg. They felt that Hamburg could have been an exemplar city for stakeholder engagement and water management interventions. Other cities could have benefited if more learning alliance members had attended international meetings.
- **Knowledge transfer:** Many thought that the international meetings were inaccessible (not invited, no funds and no time). However, some expressed interest in receiving details about each of the cities’ final outputs.
- **Time management:** Members of the learning alliance in Hamburg found that job commitments limited their involvement in SWITCH. Information needs to be presented clearly, concisely and timely to allow people to action it.
- **Strong facilitation:** A full time facilitator was sought for the last year of the project. This was critical in the success of Hamburg to continue within SWITCH and produce valuable outcomes.

A critical question is whether the SWITCH city team offered Hamburg and its learning alliances the right innovations to meet current and future challenges for urban water management. Most researchers in the original SWITCH team had fixed research agendas (urban agriculture *etc.*). Other topics relevant for Hamburg, such as improving the ageing conventional water supply and wastewater infrastructure or improvement of flood protection, were not addressed.

Researchers and the Hamburg learning alliance mainly focused on IUWM and WSUD – topics that had been identified by the Hamburg based researchers at the start. Some learning alliance members were interested in these topics but others judged these approaches to be too theoretical, irrelevant to practical problems or “too visionary”. Other topics of interest were not introduced. For example, eco-sanitation was only addressed outside the learning alliance. In the first period of the Hamburg learning alliance, there was an imbalance. SWITCH was proposing a major change in urban water management but most members of the alliance were engineers and more interested in solving current problems.

The SWITCH city team in the second period tried to focus on specific topics and problems relevant for learning alliance members. However, learning alliance members thought that it would have been beneficial to have a demonstration where the project and learning alliance could come together.

At the beginning, the SWITCH project promised to promote a perceivable change in the urban water management in the city. With hindsight, this promised too much, because only minor changes were achieved. There remains the question of what change could be achieved by a single research project using a small local team in a large metropolis like Hamburg? This is a question that polarised opinion in the learning alliance. There were several comparable research projects which also try to promote a more sustainable urban drainage system. A change in the current approach to urban water management could perhaps have been better achieved through cooperation with the other research projects.

**Acronyms in use in this chapter**

AWW	Institute for Wastewater Management and Water Protection at the Technical University Hamburg-Harburg
BSU	State Ministry for Urban Development and Environment
BSU - LP	Department of Land Use and Landscape Planning
BSU - U	Department of Environmental Protection
HPA	Hamburg Port Authority
HCU	Hafen City University
IBA	International Building Exhibition Hamburg
IGS	International Horticultural Exhibition Hamburg Inc,
IUWM	Integrated urban water management
SAGA	Siedlungs-Aktiengesellschaft Altona (Housing Corporation)
WSUD	Water sensitive urban design

**Reference**

Hoyer, J., Dickhaut, W., Kronawitter, L. & Weber, B., 2011. *Water Sensitive Urban Design – Principles and Inspiration for Sustainable Stormwater Management in the City of the Future. SWITCH*. jovis Verlag GmbH: Berlin. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WS1\\_GEN\\_MAN\\_D5.1.5\\_Manual\\_on\\_WSUD.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WS1_GEN_MAN_D5.1.5_Manual_on_WSUD.pdf) [Accessed 22 May 2011].



# 2.10

A school's art competition on the theme of water in the city. (Photo credit: Lukasz Nowacki)

## Poland



Lodz



EUROPE

## Lodz: city of water

By Iwona Wagner, Carmen da Silva Wells, John Butterworth and Monika Dziegielewska-Geitz

### Introduction

Despite being a landlocked city in the centre of Poland, water flows through the history of Lodz – indeed, its very name means boat. The 18 waterways that run through the city made a substantial contribution to transforming Lodz from a provincial town to a major manufacturing and textile centre, known as ‘the Polish Manchester’. However, industrialisation also contributed to destroying the natural resources that had been so important to the city’s development. The rivers were buried underground and eventually became part of the sewerage system.

The 1930s depression and the economical transformations in Eastern and Central Europe in the 1980s destroyed the city’s textile industry. Since then the population has fallen to just under 800,000 inhabitants.

Today Lodz is once again looking to its waterways to revitalise the city, in part by restoring polluted streams that were canalised or buried. An alliance of city managers, government agencies, academics, activists and investors came together to put water centre stage in the new urban development. Ecologically-focused restoration of rivers and green spaces was planned to reduce the risk of flooding, improve water quality in streams and aquatic habitat, and generate sustainable economic development.

Before the arrival of the SWITCH Project in 2006, water management in Lodz was conducted mostly within separate organisations. During the course of the project the majority of main decision makers and stakeholders became engaged in integrated efforts to build a future city and share their experience and thinking through a learning alliance. These efforts look likely to continue in some form after the end of the project. SWITCH in Lodz helped to break down barriers and bring together researchers, experts with practical skills, political leaders who could make things happen and civil society forces that contributed creative and innovative energy. The city has a shared vision and some idea of how to achieve it.

## Project methodology in Łódź

Using the results of integrated science and ecohydrological<sup>1</sup> studies, SWITCH in Łódź introduced a package of measures for integrated urban water management and system solutions, to meet social and economic challenges. These opportunities in water use contribute not only to better environmental quality but also to the wellbeing of a region, its ecological security and sustainability (Wagner *et al.*, 2009). Key activities in Łódź focused around reducing flood peak flows and levels of pollution in rivers resulting from storms, and improving the quality of the urban environment by making Łódź's hidden waterways more accessible and attractive. Reduced flows from flash storms are expected to improve wastewater treatment and efficiency, the ecological status of Łódź's rivers, reduce stormwater pollution and protect city properties. Lower pollution levels in watercourses also make waters safer for recreational use.

The SWITCH research agenda focused on developing ecosystem biotechnologies and system solutions for urban areas, in particular:

- river restoration following ecohydrology principles
- utilising sewage sludge (waste) as a productive resource, fertilising willow plantations for biomass and bioenergy production
- sustainable urban planning based on water and green resources to improve the quality of life and the attractiveness of the city.

### Intervention logic

SWITCH developed an intervention logic with four hypotheses, which together constitute the project's 'theory of change'. These stated that:

- improved monitoring and research will lead to better understanding of ecological and hydrological processes and therefore to better comprehension within management institutions of the role of rivers, leading to better designed interventions
- urban water management demonstrations, based on ecohydrology principles and a systems approach, will lead to more effective and sustainable solutions that minimise environmental impacts
- linking city stakeholders to research, and linking researchers to city planning and decision making processes, will help identify more effective research topics and ensure that their results are more widely used
- advocacy and public awareness activities will lead to a wider sense of ownership and sustainable use of urban waterways.

The project put effort and resources into research methodologies to translate the science of ecohydrology to urban systems (Zalewski *et al.*, 1997), and encouraged implementation through sharing experiences with Łódź University and other city stakeholders. The project team considered how to maximise the impact of technologies highlighted by the research. A learning alliance was formed to create conditions for productive dialogue on goals, problems and solutions, to plan activities jointly, share results widely and quickly, and put research into use.

The SWITCH team undertook a wide range of awareness raising and advocacy activities to engage audiences such as youth and the mass media.

1. Ecohydrology is an interdisciplinary field concerned with interactions between water and ecosystems within water bodies or on land. It is used to seek solutions to issues affecting water, people, and the environment.

## Łódź learning alliance on urban water management

University of Łódź researchers have been co-operating with the City of Łódź Office since the mid-1990s. Joint work was substantially enhanced by the establishment of the Łódź SWITCH Learning Alliance in March 2006 and the availability of EU funds. The €1,150,000 budget covered university and city office costs for five years and included €700,000 for demonstration projects. About €130,000 was invested in the learning alliance. A learning alliance facilitator and the city coordinator were trained in facilitation, process documentation, monitoring and evaluation. Staff from Łódź University and the European Regional Centre for Ecohydrology (ERCE) were hired to support events or training.

Some of the main stakeholders engaged in the Łódź SWITCH learning alliance were:

- City of Łódź Office (UML): The executive body that runs the city was the key stakeholder and partner in the SWITCH Project. UML supervises the Łódź companies that supply water, treat wastewater and are responsible for sanitation and water infrastructure. The Department of Municipal Management is responsible for managing rivers and stormwater, including the restoration of the Sokołowska river. The Department of Environment and Agriculture issues water permits and plays a key role in environmental planning. The Bureau of Entrepreneurship, Development and Investor Relations<sup>2</sup> collects and analyses key data and has a unit focused on revitalisation and long-term development. The Department of Spatial Planning and Architecture and the Office for Spatial Planning of the City of Łódź remain particularly important if SWITCH results for spatial planning are to result in large scale implementation. The Łódź Infrastructure Company (LSI) owns and develops treatment plants and networks for water supply and sewerage. The city was (and still is at the time of publication) in the middle of a major programme funded by the EU Cohesion Fund to improve water quality, reduce leakages and extend the sewerage network. Roads and tram lines were dug up as combined sewers (containing sewage and stormwater) were replaced to eliminate overflows of sewage into waterways.
- The Waterworks and Sewage System Company (ZWiK) supplies water to consumers in Łódź and Tomaszów Mazowiecki, managing over 2,000 km of water and 1,600 km of sewerage piping.
- The Łódź Wastewater Treatment Plant (GOS) operates the plant that treats sewage collected across the city.
- Research institutes involved in the Łódź learning alliance included among others: Department of Applied Ecology of the University of Łódź; the European Regional Centre for Ecohydrology; the International Institute of the Polish Academy of Sciences; Technical University of Łódź; Medical University of Łódź; Institute of Occupational Medicine in Łódź.
- Several NGOs joined the Łódź learning alliance during the SWITCH project, including ZRODLA (The Centre for Environmental Activities), GPO (Group of Certain People), and 'Łódź on Bicycles'.
- The media have proved to be important partners for communicating project results, raising awareness and changing ways of thinking.

2. Previously known as the Department of Strategy and Analysis. The name was changed during the course of the project.

## Main SWITCH activities and achievements

The learning alliance engaged city stakeholders in vision and strategy development as a way of reaching a shared vision for water and the environment in Łódź as well as a shared view on water problems and possible strategies to resolve them. Workshops on urban water management research attracted an expanding group of curious and motivated stakeholders. After 2008, many meetings were initiated by learning alliance partners or by NGOs, media or scientists not involved originally in SWITCH. Good relations with the media and public groups raised the profile of the project and attracted a wider audience of decision makers, planners and architects<sup>3</sup>.

### Results from research as a basis for implementation of IUWM

Tangible research results from SWITCH include:

- hydrological monitoring of the Sokołowska river, which allowed the development of a water budget and mathematical models for stormwater management
- a study of ecohydrological relationships in the Sokołowska River, which facilitated the design of two stormwater reservoirs with increased pollution-absorbing capacity
- a landscape survey of the Sokołowska Valley, which supported the river valley rehabilitation plan and the Sokołowska River Park project (see Figure 2.10.1)
- chemical analysis of the seasonal and spatial distribution of persistent organic pollutants (POPs) and the dynamics of cyanobacterial toxins, and the protection and management of water quality for safe recreational use
- development of bio-monitoring indicators in fish tissues as a basis for a new water ecosystems assessment method
- research on the application of sewage sludge for biomass production which focused on increasing the yield of bioenergy from willow crops
- research on river restoration, landscape validation and stormwater management leading to development of a 'blue-green network' concept – which links development of a network of river systems and green areas as a basis for spatial planning and economic development.

The blue-green network was the central concept of the project, making use of demand-led research results, capturing the public imagination and gaining the support of local authorities.

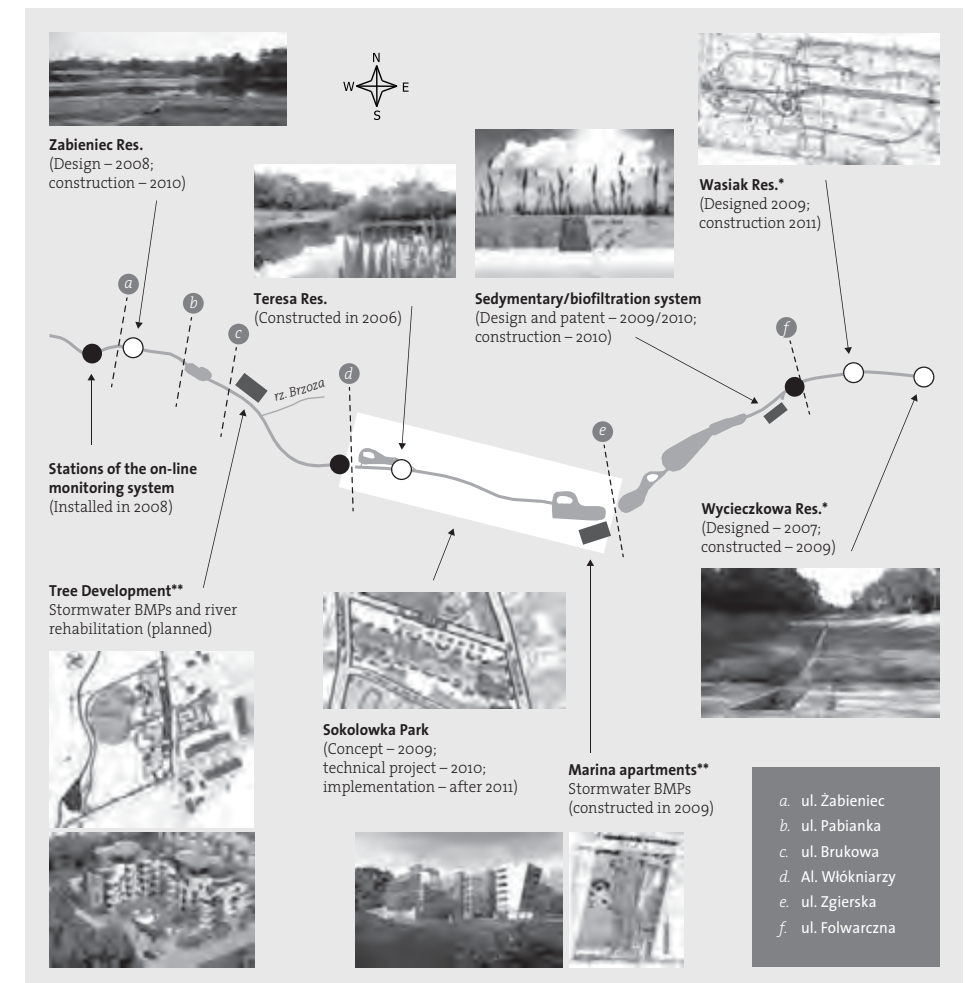
### Testing principles through pilot demonstration projects

SWITCH in Łódź used demonstration projects to test innovative methodologies for integrated and sustainable improvements in urban water management.

The City Office Department of Infrastructure, advised by the University of Łódź, began to re-engineer the Sokołowska River along more natural principles. The original plans included the construction of two reservoirs and rehabilitation of a river section.

The demonstration team also constructed and modified two other reservoirs and constructed a biofilter for stormwater purification which was patented as a SWITCH innovation at the end of 2009. The project led a wider plan for rehabilitation of the Sokołowska River and the development of a Sokołowska park, involving wider society.

Figure 2.10.1 Interventions linked to the SWITCH Project in the Sokołowska river valley (constructed, under development and in design as at April 2011)



3. A Polish website provides a central source of information: <http://switchlodz.wordpress.coms>. For information about SWITCH Łódź in English go to <http://switchlodz.wordpress.com/switch-lodz-in-english>



The second demonstration tested the feasibility of reusing sewage sludge in the cultivation of willow as a biomass energy crop. The wastewater treatment company was closely involved in this research with the University of Lodz on the use of sewage sludge as a fertiliser on pilot plantations of willow, cultivated on land next to the wastewater treatment plant. This research also involved the municipal office, private companies and citizens and led to calls for better monitoring of pollution and better enforcement to reduce levels of heavy metal pollutants in the sludge. Work began towards this long-term objective through a working group involving learning alliance members in close cooperation with lawyers and city officials. Energy generated from the willow plantations was already being used as SWITCH came to a close and methods for using more sludge were being tested.

A city with vision

At the start of the project, water management in Lodz was located in separate organisations. The visioning workshop in January 2008 brought together more than 60 participants representing 25 organisations and institutions, including top decision makers and their ‘right hands’. The workshop provided a foundation for identifying common goals which led to a plan for integrated water management.

**Box 2.10.1 Lodz vision for land and water**

By 2038 ‘Lodz Uses Its Water Wisely’ and the city will be a leading centre for innovation, education and implementation in Poland.

By that date:

- resources management will be efficient and integrated
- investors and authorities will respect ecological properties of land and waters
- infrastructure will support an environmentally secure city and population
- river valleys along open corridors will be the ‘green lungs’ of Lodz
- ecological awareness will contribute to exceptional quality of life.

The visioning workshop was a turning point in persuading senior decision makers and executives to participate in the learning alliance. They emphasised their commitment to water management issues and to positive change. They expressed pride in the Lodz vision for better urban water management and their contribution to it. The learning alliance elaborated scenarios outlining possible future challenges and strategic options for achieving the vision. A strategic planning workshop in May 2010 began the process of preparing a Strategic Document on Integrated Urban Water Resources Management for the City of Lodz. The visioning process proved highly useful for aligning learning alliance members and stakeholders towards integrated urban water management (IUWM) and it led to greater participation in this process. This was complemented by a participatory decision-making process to identify places to be included in the blue-green network.

Assessment of SWITCH in Lodz

An assessment of the project in 2010 included reviews of project documents, interviews with selected stakeholders and discussions within the project team.

- The aim was to:
- identify lessons on the effectiveness of the intervention logic
  - recommend actions for the final months of the project
  - identify mechanisms for scaling up and sustaining impact after the project.

The ERCE team made efforts to embed research results, concepts and recommendations into city strategies and plans, while elements of the SWITCH vision have been included in some of the city’s strategic documents. The idea of a blue-green network in the city was developed by Prof. Maciej Zalewski, director of ERCE, and his team. In February 2009 it was presented at a conference ‘Lodz – the City of the Future’ organised by the City President (Mayor). Information about the blue-green network concept was publicised by local media and was presented at meetings at local, regional and international events. This was one of the ways in which SWITCH influenced wider city development processes.

As the SWITCH research focus evolved, new elements were added in response to local demand. The team picked up on concerns about stormwater issues and brought in international expertise. This was highly appreciated and improved cooperation between the university and the ZWiK water and sewerage company.

According to Professor Zalewski: “SWITCH has completely changed how the city looks at water [...]. The idea that water and green areas can be central in the future of Lodz has become an accepted view in the city [...]. SWITCH has shown that there are alternative future scenarios that capitalise on the city’s green spaces and water.”

The City of Lodz Office appreciates the combination of technical innovation with practical learning backed by EU funds. In its response to the review of the project, UML said: “There is a clear timeline, budget and activities in SWITCH, so there is an impetus for moving ahead despite the political process. It has also provided international examples, which can be used to inspire and inform people in the city.”

The Lodz Infrastructure Company saw SWITCH as an opportunity to share its technical knowledge and experience and to provide information about investments and plans. It has come to realise the importance of ‘soft solutions’ like permeable surfaces and reservoirs that can complement more traditional hardware solutions like channels and pipes.

The Bureau of Entrepreneurship, Development and Investor Relations acknowledges that it was through SWITCH that they first became interested in how water could contribute to the regeneration of public spaces and the quality of city life: “Water and green spaces will contribute to sustainable innovations, solving social problems and local development [...]. While SWITCH has brought technical innovations [...] the real change is the new and integrated approach to water management.”

### Assessing effectiveness of the learning alliance

The learning alliance process became recognised as a fundamental element of SWITCH in Lodz. Learning alliance events helped stakeholders to gain a better understanding of the urban water cycle, identify problems and possible solutions together, and gain a better understanding of the perspectives of other stakeholders. People now understand that environmental and water management is not solely the business of the environmental department.

Through the Lodz SWITCH Learning Alliance, strong links have been forged between scientists, decision makers and other key stakeholders boosting their potential to scale up the use of research results. Alliance members from the City Office told the review team that the success of the learning alliance in providing a platform for exchanging information was one of the most important results of SWITCH.

The SWITCH PhD researcher who investigated the use of sewage sludge as a fertiliser came to the conclusion that SWITCH had changed the way people thought and how things were done: “Before SWITCH, people worked very much in their own department or organisation. The learning alliance and research have helped to improve the connections and to stimulate information sharing.” A research colleague agreed: “Now we have one meeting with all the relevant people present instead of having separate meetings with different stakeholders. [...] We can reach agreement sooner because of the learning alliance.”

According to the Bureau of Entrepreneurship, Development and Investor Relations, “SWITCH has introduced new vocabulary into our strategic planning process. We would like to see Lodz develop into the green capital of Poland.” The project also broadened their horizons. “Taking part in the learning alliance has helped us to get an understanding of different views of different city departments, but also has brought us into contact with ideas from schools and NGOs. These ideas now inform our work in developing strategic plans.”

There was positive feedback about the learning alliance, both for its content and for the innovative facilitation that contributed to an atmosphere of openness. It became seen as a forum where stakeholders could constructively share viewpoints and expertise, contributing to a more efficient integrated management of water-related issues. The learning alliance facilitator mentioned that stakeholders said they had chosen to attend SWITCH over other events “because we know you make an effort to make it interesting and useful.”

A learning alliance is not just about meetings. In the case of Lodz, it built good working relations between the host organisation and city authorities, with support from senior staff at ERCE and other city stakeholders. Gaining the active commitment of top decision makers to take ownership of water management was a long-term aim. Professor Zalewski had been advising the municipality to rehabilitate rivers since the 1990s but, although the Mayor was supportive, the proposal was not politically rewarding. SWITCH funding for pilot projects on river restoration, natural treatment of wastewater and the reuse of sludge helped overcome objections. The former deputy mayor became a supporter of SWITCH ideas, contributing to wider visibility of the project and wider acceptance of the importance of water for the city’s future.

Professor Zalewski said: “The learning alliance approach helps change people’s mindsets, but this doesn’t happen in just two or three meetings. It is a process that takes time.” After the visioning workshop succeeded in catching the interest of key senior representatives, it became much easier to schedule meetings and calls.

When, in 2010, a new Mayor was elected, followed by new deputies and new directors in most city office departments, this was initially seen as a threat to the continuity of the SWITCH process. However, the fact that SWITCH had built good working relationships across all levels of management had made it resilient. The new Mayor pledged and delivered full support to the International SWITCH Scientific Conference held in Lodz in October 2010, supported a public information campaign about stormwater and gave his backing to discussions with NGOs on future of the city.

The project consciously tried to involve a wider group of stakeholders. Local media were actively brought into the process and became members of the learning alliance. Newspaper articles, press releases and interviews for TV and radio raised the credibility of SWITCH. Meetings with politicians produced a consensus in favour of greater coordination of activities. Engagement with schools, the media and politicians resulted in wider awareness of the value of water and wider support for SWITCH innovations.

Putting SWITCH on the agendas of broader regional stakeholders was complicated by the absence of a cooperative working relationship between the Voivodship (province) and the municipality. However, there was still optimism and even an expectation that the wave of younger people in positions of power in the city would pave the way for change.

### Sustainability and expectations for the future

There has been continuing interest from the city office and elsewhere in seeing a platform or network similar to the Lodz SWITCH Learning Alliance continue to stimulate knowledge, information exchange and closer collaboration after the end of the SWITCH project. The University of Lodz developed a clear strategy to expand the work and to apply the technical and research experiences of the SWITCH learning alliance to bridge the gap between science and practice. One tangible impact of the SWITCH demonstration projects was a joint application for EU funding by some learning alliance members. Their aim was to work together over the next five years to use ‘ecohydrologic rehabilitation’ to reinvigorate a popular recreational area, based on the SWITCH experiences. This team has been securing funds to take over the co-ordination of the learning alliance after 2011.

Efforts continue to embed SWITCH work on integrated urban water management concepts into bodies outside the learning alliance. Recommendations regarding sustainable stormwater management for new construction are becoming official guidelines.

# Lessons learned and recommendations

The team at the University of Lodz and ERCE managed to get water management onto the city agenda by linking it with wider issues of city revitalisation and spatial planning through the concept of the blue-green network. SWITCH in Lodz engaged a critical mass of organisations with a balance of activities (research, demonstrations, learning alliance events and awareness raising). Effective project management was combined with flexibility and creativity in addressing city stakeholders’ interests and information needs.

The learning alliance was valued as a platform for information sharing and coordination, and succeeded in getting water onto the agenda of city stakeholders. Strong facilitation, support from champions and adequate resources were crucial in building trust, involvement and ownership. It takes resources, skills and dedicated facilitation and communication staff to strengthen networks, build trust and involve people at all levels.

Demonstration projects played an important role in making SWITCH visible in the city. They proved effective in demonstrating new solutions and establishing cooperation to scale-up innovation.

An international project like SWITCH provides opportunities to share ideas and learn lesson between countries. International knowledge exchanges were highly valued by Lodz stakeholders, especially expertise on stormwater best management, natural systems and spatial planning. Involving experts from other countries and visits to other cities led to more effective team work and collaboration.

SWITCH catalysed a process of change that is likely to continue. There is wide acceptance that water and green areas have an important role in the future of Lodz.

## Gaps and recommendations for future work

A number of issues need to be addressed to ensure that the change movement continues to develop in Lodz in the post SWITCH era.

- The economic and institutional impacts of interventions need attention, particularly the need to ensure social inclusion
- Better incentives are needed to increase involvement by researchers
- There is a need for innovative information methods and channels
- Links to wider policy/regulatory frameworks and authorities at provincial and national level are needed to support change
- The visioning process can be repeated to develop strategic planning for the city
- The learning alliance approach should be sustained, valuing learning as a necessary investment. Maintaining the website will also be important.

## Acronyms used in this chapter

ERCE	European Regional Centre for Ecohydrology (under the auspices of UNESCO)
GOS	The Lodz Wastewater Treatment Plant
GPO	Group of Certain People (NGO)
IUWM	Integrated urban water management
LSI	Lodz Infrastructure Company
NGO	Non-governmental organisation
POPs	Persistent Organic Pollutants
UML	City of Lodz Office
ZRODLA	The Centre for Environmental Activities
ZWiK	The Waterworks and Sewage System Company

## References

Wagner, I. *et al.*, 2009. Ecohydrological system solution to enhance ecosystem services: the Pilica river Demonstration Project. *Ecohydrology & Hydrobiology*, 9(1), pp.13-39.

Zalewski, M., Janauer, G.A. & Jolankai, G. eds., 1997. Ecohydrology. A new paradigm for the sustainable use of aquatic resources (Technical Document). *Hydrology No. 7; IHP V Projects 2.3/2.4*. Paris, France: UNESCO IHP. [Online] Available at: <http://unesdoc.unesco.org/images/0010/001062/106296e.pdf> [Accessed 27 October 2010].

2.11

Waiting for a license: these wetlands in Ganei Tikva could be used to treat grey water from apartment buildings and help green the urban environment. (Photo credit: Peter van der Steen)

Israel



ASIA



# Tel Aviv Water Club puts focus on wastewater treatment

By Philip Sharp, Haim Cikurel, Avi Aharoni, Avital Dror-Ehre, and Avner Adin

## Introduction

Tel Aviv is the financial and administrative centre of Israel with its permanent population of 386,000 people swelling to 1 million each workday as commuters flow into this Mediterranean coastal city. Fully known as Tel Aviv-Yafo, this is the workplace for more than 15% of the overall employed population of the country while the consolidated urban area surrounding the city creates a metropolis of almost 2 million inhabitants. The annual GDP per capita of US\$52,000 in Tel Aviv is three times the average for the whole population of the State of Israel.

This arid city must meet an increasing demand for water and sewage services, mainly due to intensive residential development. Mekorot the National Water Company provides 130 million cubic metres MCM of drinking water a year that meets 90% of the city's needs. The rest comes from local wells. The Government promotes sea water desalination, and as new seawater reverse osmosis (SWRO) plants come on stream, it is possible that in the near future 80% of all potable water in Israel will come from desalination.

Agriculture is a major user of water, and farmers in the south of the country are supplied through what is known as the 'Third Line', a large diameter pipe that transports treated effluent from Tel Aviv south. Israel has demonstrated world leading technologies and achievements and now reuses more than 75% of its municipal effluents (some 400 MCM/year), which makes them one of the world's highest consumer of recycled effluents and constitutes a result incomparably higher than in most other countries (<1% in EU). In 2005, reclaimed wastewater constituted some 15% of the total water sources in the country.

Tel Aviv alone produces 380,000 m<sup>3</sup> of sewage a day. The city, including neighbouring municipalities in the Dan Region Association of Towns, transfers wastewater for treatment to the Shafdan Treatment Plant (WwTP) operated by Mekorot on behalf of the Dan Region. The reclamation project at Shafdan is the largest wastewater treatment project in Israel, reclaiming

more than 140 MCM of wastewater a year. It provides secondary treatment (single-stage simultaneous nitrification – de-nitrification) and Mekorot adds a tertiary stage, soil-aquifer treatment (SAT) in open areas of sand dunes to the south of the plant. High quality reclaimed water produced by this technology is sold for unrestricted irrigation in the south of Israel (Negev), enabling the development of important agriculture markets both at home and for export. By this process, the Dan Region provides 80-100% of the water for agriculture in the northern part of the Negev Desert.

The synergistic nature of this relationship between water provider, cities and farmers is indicative of the advances that Israel has made in water management over the past 30 years.

Israel sees water as a strategic resource and the Israeli water sector is highly developed and managed around national, regional and local management bodies. This has resulted in a generally centralised, highly regulated water management structure with national policy handed down to the regional and city governments for implementation.

Tel Aviv has a small number of well-defined formal administrative structures responsible for water management:

- The Ministry of Health deals with the control of drinking water quality
- The Central District Regional Committee for Urban Planning (of the Ministry of Interior) is responsible for infrastructure permits in the Tel Aviv region
- The Ministry of Infrastructure Water Authority is the main regulatory body, responsible for all water resources in the country
- Mekorot National Water Company engages in a wide range of activities in the management, operation and treatment of all types of water resources
- The Tel Aviv Municipality Water, Wastewater and Drainage Department manages the supply of drinking water to the city and the disposal of wastewater
- The Dan Region Association of Towns supervises wastewater quality from industrial plants, the collection and transport of wastewater to the Dan Region WwTP, and treatment of the waste
- The Municipal Water Works Administration is involved in the decisions about planning and budgeting water supply and distribution systems.

Wastewater reclamation will become one of the key strategies for meeting growing future demand. With natural water resources at an all-time low, the use of effluents for municipal and public purposes (street cleaning, fire fighting, irrigation of park and recreational use) and also for food production will need to be increased to conserve drinking water supplies. Maintaining high quality effluents from the Dan Region (TA area) will be crucial for its continued development. More local effluent reuse for public irrigation and river replenishment is also expected to play a key role and this may come from small local treatment plants, using advanced technologies or natural systems (e.g. constructed wetlands).

However there is growing concern within ministries and water sector bodies about health issues over the extensive use of treated effluents and the potential for long-term environmental problems from micro-pollutants in reused water.

## Project team and partners

The concept of a SWITCH learning alliance for Tel Aviv was difficult to grasp initially, but not a wholly new idea. There have been previous multi-stakeholder platforms where water management has been the topic of discussion. Members generally know each other very well and have well developed and close working relationships. It was within this context that the SWITCH learning alliance process was launched and the core team quickly realised that using existing structures was liable to produce better results than introducing a new water platform in the city.

The initiating organisations in the SWITCH Consortium in Tel Aviv were the Hebrew University of Jerusalem (HUJI) and Mekorot, the State Water Company. Both organisations have a long history in initiating international research projects of this nature. When the Tel Aviv learning alliance was established at a scoping meeting held from 30 July – 3 August 2006, it was important that this was not seen as an attempt to usurp the role of any official water institution but as an open meeting place. What was established was a body with a structure but an informal ethos – the learning alliance became known as the SWITCH Water Club.

The member organisations of the Water Club, including those that joined later, were:

- The Central District Regional Council for Urban Planning
- The Water, Wastewater and Drainage Department of the City of Tel Aviv
- The Dan Region Association of Towns
- The Water Authority of the Ministry of Infrastructure
- The Ministry of the Environment
- The Ministry of Agriculture
- The Environmental Health Department of the Ministry of Health
- 'Man, Nature, Law' – an NGO
- The South of Israel Farmers' Association
- The Water Workers' Association
- MEKOROT – the National Water Company
- Soil and Water Department at the Hebrew University of Jerusalem
- The Israel Water Association
- AYALA Water & Ecology
- Yarkon River Authority
- Haham – Ben Zvi Architects/Elram Consultants.

Some of the members did not stay the course – in particular the Water Club did not succeed in retaining the interest of NGOs and farmer organisations. However, other organisations were represented by individuals who contributed to the decision-making process in the national, regional and municipal water sectors. The members of the Water Club had (and have) the ability to develop a vision and promote it to the city development programme. These important characteristics of the members were, in the view of the Tel Aviv learning alliance facilitator and coordinator (Avital Dror-Ehre and Avi Aharoni), crucial to establishing and disseminating the idea of the learning alliance as a key process for sustainable development in Tel Aviv and other cities in Israel.

### Intervention logic and methodology

Based upon the Tel Aviv 'theory of change', the SWITCH project adopted an intervention logic which aimed to make a difference in the future water management and water related aspects of the city and meet the growing water demands of the landscaped areas in the city and the agricultural lands beyond the urban areas. Rather than focusing solely on new research, SWITCH aimed to put research into use and ultimately to achieve more sustainable urban water management. In line with this, the inception of SWITCH in Tel Aviv was initially seen to follow on from work carried out in a number of previous research projects. The working hypothesis was based upon conducting field monitoring and laboratory experiments to provide a scientific basis for new treatment processes.

Many of the research institutions involved in SWITCH have long-term expertise in Soil Aquifer Treatment (SAT), Electroflocculation (EF) technologies and Constructed Wetlands (CWs), which constituted some of the key issues addressed by SWITCH. Research on these topics has been based upon that in other programmes, most specifically in the EU RECLAIM, project which was looking for alternative technologies for water reclamation for unrestricted irrigation.

Soil Aquifer Treatment requires a relatively large space for gradual infiltration, which takes some 6-12 months depending on the season. Traditional forms of SAT are limited as dynamic growth in the Tel Aviv metropolis, escalating land prices and pressure from developers are leading to a lack of suitable open space. There is also a need to upgrade the chemical parameters of the reclaimed water and eliminate technical problems which slow up filtration. Other technologies are also needed for smaller communities. These include constructed wetlands (CW), electroflocculation (EF), CW-EF hybrids and granular filtration (GF).

## Results and discussion

The overall aim of the SWITCH research was to combine CW and EF technology to upgrade secondary treated effluent to the level that would permit its safe use for stream rehabilitation, park irrigation and other municipal uses that require high quality reclaimed wastewater. It also looked at the removal of micro-pollutants in reclaimed water. One of the major issues was to investigate the efficiency of phosphorus removal by conventional CW and combined CW-EF systems. The research concentrated on evaluating and comparing the efficiencies of a constructed wetland and the electrochemical technology when used together in parallel or in series.

Research into CWs was conducted in the Water Treatment Technology Laboratory of the Hebrew University, under the leadership of Prof. Avner Adin. SWITCH in Tel Aviv put considerable effort and resources into laboratory and field experiments and monitoring systems in order to quantify fundamental processes related to CW and hybrid treatment methods. They obtained good data that provides a baseline for the successful design and monitoring of such treatment processes.

The researchers asked SWITCH to look at what happens to micro-pollutants in the final effluent being transported through the Third Line for irrigation of crops. It was important for SWITCH to check and compare an alternative method based on the principle of removing 'clogging' material by an extensive short SAT and final polishing on a nano-filter. This method efficiently removes micro-pollutants and was adopted as the SWITCH demonstration activity in Tel Aviv.

Preliminary planning for a pilot plant in the Shafdan WwTP started in the second half of 2006 and a suitable site was eventually selected in mid-2007. The construction of the SAT+NF pilot started and the first three SAT fields were constructed, each one being 5x8 metres with an observation well 5m from the SAT fields and a recovery well 15m from the SAT fields.

SAT is not a new process in Israel and has been the chosen method of tertiary treatment and recovery of treated final effluents (Shafdan WwTP) for several years. However, as Israel looks to grow fruit and vegetables for export to high-value markets in Europe and other regions, there is a need for constant vigilance against the risks of contamination through reuse of final effluents as irrigation water.

In the SWITCH pilot experiment, nanofiltration (NF) as a polishing stage was shown to be more effective in removing certain fractions such as sulfamethoxazole, and also obtained a very low dissolved organic carbon (DOC) level when compared with results using UF-RO membrane processes.

Two types were tested NF 270 and NF 90. When the NF 90 (a more permeable membrane) was used, more energy was needed and less water was recovered, although this enabled swift no-clogging operation of the membrane and salts to be almost completely removed. But as the NF 270 was also effective in removing most of the targeted micro-pollutants, its use will lead to a more economical solution if 100% complete salt removal is not necessary.

The importance of removing micro-pollutants in drinking water and reclaimed unrestricted irrigation water is increasing as new detection methods become available. Of major concern is the fate of endocrine disruptors, antibiotics and pharmaceutical micro-pollutants.

Work on constructed wetlands acting in combination with other hybrid processes (treatment trains) was also considered to see if this would improve reduction of phosphates in effluents. While EF effectively reduces phosphate in both soluble and particulate forms, CW treatment provides an effective transport-attachment trap for turbidity that escapes the electro-physicochemical process and removes organic matter and other nutrients. Laboratory tests showed that EF coupled with sand filtration effectively removes phosphate and suspended particles in contrary to the wetland gravel performance. The wetland gravel effectively removed organic matter, possibly by microbial degradation.

Field pilot results showed that the EF reactor was capable of removing up to 97% of phosphorus, obtaining final concentrations smaller than 0.4 mg/l. The hybrid process also enhances the removal of suspended solids (87%) and organics (53%) in addition to phosphorus removal. A well designed sand filtration following the EF reactor is therefore a key output and highly recommended for such uses.

The Ministry of Health is committed to following up this research programme and to look in more detail at the fate of micro-pollutants to see how they are taken up in the vegetables and crops grown and to make assessment of the risks, if any. To this extent, it can be said that SWITCH has made an impact on water management in Israel by demonstrating new approaches for the removal of pollutants.

Laboratory experiments evaluating the efficiency of removing selected nutrients by CW and other techniques, provided data that should be very useful in the current debate on centralised versus localised effluent/greywater recycling. The research was highly relevant and the results encouraging enough to note that it has taken the issue of recovering and reusing wastewater and greywater a step further. Constructed wetlands are starting to be seen as safe solutions that can be integrated into 'treatment trains' to produce consistent results.

The short-term SAT+NF and the constructed wetlands demonstrations provided much needed information for refining the advanced final effluent recovery processes being used in Israel. This will contribute to greater water efficiency and the safer use of final effluents in unrestricted irrigation. Various members of the learning alliance and others stakeholders have attended training and dissemination workshops to see scaled up working models of the processes. This enabled them to have a better understanding of these processes and the part they can play in water reuse. The publication of this data will support other organisations and countries who are piloting the development of similar systems in water stressed environments.

The demonstration of constructed wetlands with EF has assisted various ministries and planning offices to allow greater use of localised effluent re-use in appropriate circumstances. This can be incorporated into future developments.

**Strategic plan for the city**

SWITCH in Tel Aviv went beyond the research agenda and had an influence on the future planning of the city. The Municipality of Tel Aviv was preparing a master plan for the city, and it is thought that this will become a flagship example of urban planning to be taken up by other municipalities in Israel. The plan is based on wide public participation; consensus building; early completion and formulation of action plans which are widely recognised to be transparent and published. The plan includes a series of over 50 indicators, covering education, health, transport, housing, etc and these indicators form the basis of a monitoring system for implementation and progress.

However, none of the 50 indicators touched on water. The Water Club established a steering committee supported by a water expert to develop preliminary indicators to be submitted to the Municipality of Tel Aviv for inclusion in the master plan, covering unaccounted for water, water demand, sewer separation, roof water collection, impervious area preservation and other issues. The Mayor of Tel Aviv gave his blessing to the development of water indicators. Once agreed by the Municipality they would become final indicators and the results from monitoring would be given to the public at regular intervals.

**Box 2.11.1 Water Club helps Green House to win demonstration status**

One example of how practical work and research came together in Water Club discussions is the Green House proposal by Haham-Ben Zvi Architects within the University grounds in Tel Aviv. This environmentally sustainable building was inspired by impressive methods of water recovery found in the remains of a house close to the Yarkon River dating from the Iron Age Period. Haham-Ben Zvi tried to provide modern interpretations of these ancient water management systems.

The house will maximise the capture of scarce water by recycling, rain-harvesting and air-conditioning condensate capture. It will use solar energy together with the natural capacity of the site for ventilation purposes.

Shalom Goldberger, Chief Engineer for the Ministry of Heath, Tel Aviv, says they find it very difficult to give licences for local greywater recycling schemes, as it is often very unclear how these plants will perform and how they will be maintained over time. Because of lack of information about smaller scale systems the public may be exposed to risk.

After discussions at the Water Club, the Ministry said it would be prepared to look at the Green House as it constituted a well-controlled and managed demonstration of small scale greywater recycling within a university site, and this would assist them in developing guidelines for the future. The University is now considering whether to construct a building of its own with many of these sustainable features.

There is a similar situation with an ambitious plan by Ganei Tikva municipality, close to Tel Aviv. The Municipality decided to introduce their own 'third pipe' system so that all new buildings are provided with greywater recovery pipelines, which keep greywater separate from blackwater waste. In the municipal plan, this greywater is conveyed to horizontal constructed wetlands which clean it up and send it to a number of cascading pools within a park. The treated effluent arrives at a large reception tank at the lower end of the park where it would be screened and pumped to provide irrigation water to the Municipality landscaped areas.

The Ministry of Health was unwilling to give a licence, saying that they were concerned about the long-term safety of the system and the potential for contamination of the ponds where children may be exposed to a hazard. However, the grey-water recovery system is now going ahead with the introduction of a chlorination stage in the process to avoid any health risks during a monitoring period prior to the Ministry of Health deciding whether this is an acceptable system.

The Tel Aviv learning alliance discussed this matter with the Ministry of Health and a Member of Parliament who has taken up this matter. Again there are discussions about how this might operate as a demonstration under the supervision of an institution (such as a university) that would be responsible for monitoring and maintaining a safe environment.

# Conclusions

- It is recognised that water management in Israel is of strategic importance and that Israel is one of the leading countries globally with regards to water treatment, water efficiency, irrigation systems and water reuse.
- The process of developing the Water Club made water professionals, urban planners, scientists, agriculturalists and environmentalists feel more comfortable in speaking to each other on matters relating to water management and to move towards changes that will lead to integration in the management of water in their city. The Water Club has been recognised as a platform where the majority of water sector participants can meet and exchange ideas more easily than in official meetings. The Water Club has met since the SWITCH project ended and there does appear to be a feeling that key members should continue to meet at least annually.
- The learning alliance concept has been enthusiastically adopted in Tel Aviv, albeit with some interesting local reinterpretation. This process was greatly facilitated by the strong reputations of the key SWITCH Tel Aviv Management Team members. The learning alliance facilitator was seen as a respected and dedicated professional, who is comfortable with the concept of a multi-stakeholder platform. She possesses extensive knowledge of the Tel Aviv/Israeli water sector, water issues and problems; she knows the stakeholders, their perceptions and expectations. However, she was heavily committed to her work outside SWITCH and may not have been provided with sufficient resources to undertake this role in the manner envisaged.
- The Water Club was seen by its members as an informal platform which went on to achieve some very positive outcomes such as advancing SAT processes and initiating sustainable water indicators in the next version of city strategic plan.
- Demonstration projects were largely defined prior to the formation of the Water Club but were endorsed by the learning alliance membership. There was widespread agreement on the need to undertake further scientific work on the SAT process and the potential for reducing land use and reducing the occurrence of micro-pollutants in treated wastewater effluents.
- Short-term SAT+NF has shown to be a low cost and a relatively easy to replicate option for treating wastewater effluents to a high quality for use in unrestricted irrigation of crops on a large scale. Further papers, training and dissemination relating to this demonstration will ensure the continuation of the uptake of this research.
- Support for research on constructed wetlands was very cogent in the current debate regarding local versus centralised wastewater recycling and added to the available body of knowledge on treatment options.
- The presence of micro-pollutants in water is one of the main discussion topics within the Water Club and with major stakeholders (governmental offices, academic institutions and Mekorot). This demonstration together with similar projects inside and outside SWITCH have contributed to the development of hybrid SAT-membrane processes that can produce very high quality water out of secondary effluents. It has been shown that micro-pollutants can effectively be removed by the short SAT+NF 270 process thereby obtaining safe quality water for reuse in agriculture.
- It is widely considered that including sustainable water indicators in the Tel Aviv Yafo strategic plan, could have a significant and long lasting impact in the city, and potentially Israel as a whole. The Water Indicators have been condensed to make

- them more manageable and a number of key indicators have been adopted by the Municipality. It is likely that other cities in Israel will follow this lead when planning their own urban environments.
- The Water Club was composed of strong and committed individuals. However, the membership may have been too close to the day to day management of water and water related issues. Despite the early inclusion of an NGO and a farmers' association in the learning alliance it was difficult to maintain their longer-term interest and regular attendance. Perhaps there is a need to better explore this phenomenon in more detail across the SWITCH cities to see if this was a common experience, and try to ensure that wider stakeholder participation can be achieved in future programmes.
  - A greater focus on the process of selecting and training local individuals would have provided a faster start and a better understanding of this way of developing an effective stakeholder group. There was clearly a lack of understanding of the role that reporting and process documentation play in the approach.
  - It is generally accepted by the Tel Aviv SWITCH team that certain administration matters, such as reporting, process documentation, stakeholder analysis, *etc.* have not been high enough on their agenda owing to pressure on time and resources.
  - The City Co-ordinator felt that SWITCH suffered from large amounts of bureaucracy and administration and that this may be seen as a missed opportunity to streamline the approach and free up time for other activities.
  - The failure to establish a Global SWITCH learning alliance was seen as a missed opportunity. Shared research and experiences were also areas where it was considered SWITCH could have provided more impact. A number of interviewees had greatly benefited from the global meetings/symposiums they were able to attend.

## Acronyms used in this chapter

CW	Constructed wetlands
CW-EF	Constructed wetlands and electroflocculation hybrids
DOC	Dissolved organic carbon
EF	Electroflocculation
EF-GF	Electroflocculation and granular filtration
GF	Granular filtration
HUJI	Hebrew University of Jerusalem
IUWM	Integrated urban water management
M&E	Monitoring and evaluation
MCM	Million cubic metres
NF	Nanofiltration
RO	Reverse osmosis
SAT	Soil-aquifer treatment
SAT+NF	Soil-aquifer treatment with nanofiltration
SWRO	Seawater reverse osmosis
UF	Ultrafiltration
UF-RO	Ultrafiltration and reverse osmosis
WwTP	Wastewater treatment plant



2.12

Demonstration site on rainwater harvesting for urban agriculture.  
(Photo credit: René van Veenhuizen)

China



# Beijing: alternative water sources for peri-urban agriculture

By René van Veenhuizen, Cai Jianming, IGSNRR, and Ji Wenhua, IGSNRR

## Introduction

### A water scarce city

Beijing is a water-scarce city. Water consumption is about 209 m<sup>3</sup> per capita and increasing quickly with population growth and improvements in living standards. It is foreseen that water consumption will outstrip available water resources in the near future. Beijing has decided to disperse out of the city businesses that consume large amounts of water including irrigated agriculture, a step that which will deprive vulnerable groups of people, notably migrant farmers, of their livelihoods.

Beijing lies in the northern tip of the North China Plain and has a moderate continental climate with average annual rainfall of about 500 mm. In 2008, Beijing had a permanent population of more than 16.95 million plus four million migrants. Of this total, 4.67 million people live in the peri-urban districts and counties of the metropolitan area.

Metropolitan Beijing experienced rapid economic growth averaging 15 per cent per annum from 2005-2008. However, there is a sharp disparity between urban and rural incomes, a vast inflow of migrants, rapid loss of farmland and a rapid deterioration of the urban environment.

### Water and peri-urban agriculture

China's economic policy focused on urban development in recent years until the 11th Five-Year Plan (2006-2010) placed emphasis on protecting and strengthening rural cultural traditions. The 12th Five-Year Plan (2011-2015) has greener ambitions, seeking more inclusive, balanced and sustainable economic development. The nationwide New Countryside Development Programme that started in 2006 integrates agriculture and the countryside within city limits into urban planning and enhances the income of rural farmers by implementing various preferential policies.

Figure 2.12.1 Urban and peri-urban Beijing, also showing area of rainwater harvesting demonstration



Urban agriculture is seen as a creative concept that links modernisation and cultural inheritance. Agricultural cooperatives have been created and stimulated. By the end of 2006, the Beijing Municipal Water Authority had established more than 3,300 farmers' water use associations.

Rainfall has been below average over the nine years from 1999-2007 and the level of groundwater has fallen (Beijing Water Authority, 1999-2008). In some places it is more than 30 metres below the surface, making it difficult for farmers to reach. In addition to building large reservoirs and inter-regional water transfer projects, the government is stimulating water reuse and conservation. The Beijing government is actively promoting the development of agriculture in the peri-urban areas as part of the New Countryside Development Programme.

The productivity of agricultural land in peri-urban Beijing has increased enormously as traditional farming has given way to more intensive production often linked with agro-enterprises that process and market herbs, vegetables, flowers, *etc.* Farmers' incomes have doubled in the last 10 years. Agro-tourism in peri-urban Beijing has also made great progress,

offering visitors from urban areas an opportunity to stay in farmers' houses, pick fresh vegetables and buy food from the farm, so that peri-urban farmers increase their income and urban residents enjoy nature. Some 200,000 of the four million migrants in Beijing have developed their livelihoods based on urban agriculture.

### Wastewater use

Beijing is also a city with serious water pollution. Despite the treatment of wastewater increasing from 56% in 2004 to 79% in 2008 (Beijing Municipal Bureau of Statistics, 2009), large amounts of untreated wastewater are still dumped into main rivers in the city. The use of wastewater has a long history in China, but only in 2000 did the municipal government start to encourage farmers around Beijing to use treated water from the central wastewater treatment plants. Urban agricultural use of wastewater in Beijing increased from 70 million m<sup>3</sup> in 2004 to a planned 400 million m<sup>3</sup> by the end of 2010. However, not all farmers around Beijing can access treated wastewater.

### Rainwater harvesting

Rainwater harvesting has been practised for thousands of years in rural China. In Beijing, rainwater harvesting systems are promoted and techniques like porous pavements and roadside gutters are used to collect stormwater from roofs and roads to use (since 2000) for irrigation of parks and gardens, aquifer recharge, maintaining water levels in small ponds and lakes, and, after simple treatment, for other uses like car washing (Ji, Cai and He, 2010). In the Beijing Olympic National Stadium, rainwater was used for flushing toilets, cooling towers, fire fighting and irrigation of green areas (Scholes and Shutes, 2008). By 2006, more than 300 rainwater-collecting projects had been built and 45 million cubic metres of rainwater were used in 2008.

In 2005, the Beijing Agricultural Bureau began promoting the use of rainwater from the roofs of greenhouses for the irrigation of crops. These rainwater harvesting projects became popular, because they are relatively simple to use and maintain, and because they are subsidised by the government.

Given the fact that Beijing is seriously shortage of arable land and of water, there is a great demand for innovations in new water sources and efficient water use. It was at this opportune moment that SWITCH arrived.

## SWITCH in China

SWITCH activities in China were built on existing contacts between the ETC Foundation with the Institute of Geographic Sciences and Natural Resources Research – Chinese Academy of Sciences (IGSNRR-CAS) under the programme of the International Network of Resource Centres on Urban Agriculture (RUAF Foundation).

**Box 2.12.1 Objectives of SWITCH in China**

- to establish an active learning alliance network on water issues in Beijing and Chongqing (later Chengdu)
- to improve the water management in Beijing and Chongqing/Chengdu through a multi-stakeholder approach
- to improve urban planning and urban development in Beijing and Chongqing/Chengdu from the perspective of integrated water use and management
- to seek best models and technologies for water use in Beijing and Chongqing/Chengdu through international cooperation.

The basis for research and implementation work in China came from two themes under SWITCH: one on urban agriculture and the efficient use of rainwater harvest and the other on eco-sanitation. SWITCH also offered a platform for institutions to meet, talk and express opinions.

Even before SWITCH had been approved by the EU, it became clear that demonstration activities linked to eco-sanitation could not take place in Beijing, due to an embargo on building activities that had not been approved for the 2008 Olympics. Part of the demonstration project had to be shifted to Chongqing, the most important economic and cultural centre in the higher part of the Yangtze River and Three Gorges Area (and later moved again to Chengdu).

This effected the development of SWITCH. The ambition of creating effective links between work in two cities under a National Learning Alliance was not met, and this chapter focuses almost exclusively the work in Beijing.

The intervention logic in Beijing was largely based on the following sequence:

- exploring challenges through background and context analysis on water issues in the greater Beijing area
- identifying priorities and pathway through learning alliance workshops and networks on visioning and strategic planning
- setting up working groups to supervise further research and demonstrations to discover best practice in rainwater harvesting (RWH) for urban agriculture development and a possible approach to scaling up
- disseminating findings in the network and writing up training materials/guidelines on RWH practice, which can be applicable in Northern China in similar settings
- influencing policy making by presenting findings at various government-organised workshops.

The SWITCH programme in Beijing, together with RUAF-China, sought to demonstrate a model of urban agriculture that incorporates multiple sources and efficient use of water, delivering higher returns by diversifying production and services. These higher returns not only cater for water fees but also enable farmers to pay for the relatively high investment for the rainwater harvesting facilities.

**The SWITCH Learning Alliance and the Beijing Working Group**

The learning alliance approach envisaged by SWITCH aimed for participation by senior members of higher level authorities. This is still not an appropriate approach in China, where planning is a complicated process of bottom up influence and top down implementation, and large cities require their plans to be approved by the national government.

Policy making is evidence based, so one needs to offer higher-level authorities good results or new technologies with proven potential, to allow strategic planning to be done at that level. The higher the level you seek to influence, the better your evidence needs to be. As Cai Jianming, SWITCH City Coordinator, put it, “You need to show good results and evidence when inviting higher officials at city level for visioning and strategic development session. This is often not well done, and lots of current findings are not very convincing to the decision makers.”

In addition, local government bodies often lack the patience to work through multi-stakeholder processes and prefer quick decisions based on “learning by doing”.

At meetings, it is usual for the higher level official to talk and then leave. This is slowly changing, and those involved in SWITCH appreciated the open character of the process very much.

At the first SWITCH learning alliance meeting, it was agreed that two working groups would be facilitated: one in Beijing and one in Chongqing as part of the SWITCH Learning Alliance on Decentralised (Waste)Water Use Systems. It was agreed to focus initially on the working groups and develop the learning alliance between the two cities (and perhaps nationally) in a gradual manner.

The linkages between Beijing and Chongqing did not evolve as foreseen. This broader (Beijing and Chongqing) learning alliance met only three times as a whole. However, the two working groups regularly met to facilitate ongoing work.

The Beijing Learning Alliance was facilitated formally and informally by IGSNRR, through bilateral meetings, mini-conferences and interviews. The learning alliance remained informal and in most cases was restricted to bilateral discussions between institutions involved in SWITCH. This style of working proved to be effective in reaching consensus. IGSNRR subsequently disseminated these agreements to the larger group of stakeholders in the informal network. This created the possibility of freely exchanging ideas and information, thereby influencing policy development within the institutions and at district level and potentially at the municipal and national level as well. Innovation and experimentation was made possible while staying aligned with official city planning and the city strategic vision.

The Beijing Working Group brought together actors involved in peri-urban agricultural development, including farm cooperatives, universities, research institutes and government departments. It was very active and met many times, although it remained informal. The role of the core/working group was essential in bringing together main and active partners to adapt, facilitate and promote innovations in rainwater harvesting and urban agriculture.

Table 2.12.1 **Members at the first meeting (2007) of the SWITCH Learning Alliance on Decentralised (Waste) Water Use Systems**

Institutions	Members
Ministry of Housing and Urban-Rural Construction of China, Department Science and Technology:	• Mr. Wu Yong, <i>Chairman</i>
IGSNRR-CAS:	• Prof. Cai Jianming, <i>coordinator LA Beijing</i> ; • Prof. Li Lijuan, <i>facilitator</i> • Lu Aifeng, <i>post-doctoral</i> • Mr. Ji Wenhua, <i>PhD candidate</i> • Mr. Li Jiuyi, <i>PhD candidate</i> • Miss Zhang Feifei, <i>RUAF China research assistant</i>
Chongqing University:	• Prof. He Qiang, <i>city coordinator Chongqing</i> • Dr. Zhai Jun
Water Resources Department of the Ministry of Water Resources:	• Guan Enhong
Beijing Hydraulic Research Institute:	• Sr. Eng Ye Zhihan
Beijing Water Environment Protection Bureau:	• Dr. Wang Yan
Beijing Municipal Research Institute of Water Planning:	• Chief Eng. Zhang Tong
Chinese Research Institute of Urban Planning and Design:	• Sr. Eng. Zhou Changqing
Beijing Agro-Technical Extension Centre:	• Wang Zhiping, <i>Deputy Leader</i>
Beijing Municipal Water-Saving Centre:	• Eng. Zuo Jianbing
Beijing Normal University-WUR:	• Dr. Zhang Mingshun • Prof. Liang Jinshe • Prof. Wang Hongrui
China University of Geo-sciences:	• Dr. Wang Jin
Xiedao Group:	• Mr. Fu Xiuping ( <i>President</i> )
Huairou Cooperative:	• Ms. Zan Xiaojing • Mr. Zhao Qingzhong

Involving the Huairou Cooperative in the multi-stakeholder working groups demonstrated their significance to the other institutions and allowed them to share their opinions on the need to improve water saving and production technologies. Partners in the Huairou working group visited participating institutions regularly to keep them informed and obtain their views.

#### Box 2.12.2 Roles of main participating institutions in Beijing

**Beijing Water Conservation Office, Beijing Water Authority:** Sets policies and plans related to water conservation; collects water charges; and imposes penalties on those who exceed water use.

**Beijing Hydraulic Research Institute, Beijing Water Authority:** Works on the protection of surface drinking water sources, in particular the two main surface drinking water sources for the city, the Miyun Reservoir watershed and the Guanting Reservoir watershed'.

**College of Water Sciences, Beijing Normal University:** Researches water sciences, underground water environmental protection and engineering. Carries out research for the Ministry of Education.

**Beijing Municipal Research Institute of Environmental Protection:** The first environmental protection sciences and research institute in China researches water pollution control, air pollution control, environmental management, environment integrated protection, control of industrial sewage, etc.

**Beijing Agro-technical Extension Centre (affiliated with the Beijing Agriculture Bureau):** Responsibilities include demonstration and extension of new agricultural technologies with training in these technologies and documenting measures and experiences.

**The Ministry of Water Resources:** Responsible for the administration and management of water resources, and the formulation of water-related policies, development strategies and plans. Drafts and implements enabling legislation, regulatory frameworks and economic regulatory measures for the water sector. Drafts and reviews reports on water sector capital construction projects. Provides guidance related to rural water resources. Responsible for the day-to-day work of the State Flood Control and Drought Relief Headquarters.

#### Vision for Beijing

After a training session about visioning, a first draft of the Beijing water vision was shared and discussed in formal and informal meetings. A total of 20 learning alliance members participated in the first official Beijing water vision and strategy conference in June 2009. Stakeholders agreed an adapted version.

**Box 2.12.3 Beijing Water Vision 2030**

By 2030, the city of Beijing will achieve more sustainable urban water use through improved management of its available water, raising water quality and ensuring a fair spatial allocation of water resources and good water governance.

A good balance between water availability, supply and consumption will avoid depletion of groundwater levels, which will be restored to 1960s levels, and low flows of rivers will be protected so that rivers flow all year round.

Water quality at the tap will meet the best international drinking water standards suitable for direct consumption, while rivers and lakes will be protected or rehabilitated to meet Surface Water Quality Standards grade III and above. Groundwater pollution will be minimised.

There will be a high degree of equity and efficiency in water use, and different quality water will be used in different sectors as appropriate with a high level of water reuse. Harmonised regional water use is achieved through fair spatial allocation of water resources, avoiding conflicts with upstream and downstream areas through negotiation and appropriate compensation.

Good water governance will build a water saving and pollution prevention focused society with open public access to information and participation of stakeholders in decision making. Good planning will prevent or mitigate disaster damage.

**Demonstration projects**

SWITCH aimed to contribute to a paradigm shift in wastewater management and sanitation which would result in a closed loop approach in which wastewater would be recycled and reused. However the project failed to develop combined work that was originally foreseen on eco-sanitation. Exchange of ideas and information occurred too late in the process to allow for joint research and demonstrations.

The SWITCH demonstration project in Beijing supported rainwater harvesting using greenhouses by analysing water flows, costs and benefits and by working with a Huairou Vegetable and Fruit Cooperative to link other productive activities, like mushroom production and agro-tourism.

The demonstration project collected rainwater from the outer surface of a rainwater collection flume, which flowed into a deposit pool and used this water in drip irrigation. Previously, the farm in Huairou depended totally on groundwater, which needed to be pumped from a depth of about 40 m. Using rainwater harvesting could reduce the cost of water and damage to crops through lack of water. Capturing and using rain could directly slow down groundwater

depletion, (although it can be argued that the harvested water would have helped to recharge groundwater to some extent if it had not been captured).

This demonstration showed that the technology provides a useful source of water for intensive agriculture under greenhouses. It will particularly be feasible and profitable if the multiple functions of agriculture are combined (Ji, Cai and Wang, 2010). The underground rain water storage pond is not only used for irrigation in the greenhouses, but also for growing mushrooms during dry seasons when (part of) the storage pond is empty.

**Box 2.12.4 Huairou Fruit and Vegetable Cooperative**

SWITCH collaborates with The Huairou Fruit and Vegetable Cooperative in Angezhuang village, in Huairou district, where 1,108 households specialise in the production of vegetables, grapes and Chinese dates. Ms. Zan, the cooperative director, told the assessment group:

“The farmers of the cooperative used groundwater for the irrigation, but in recent years the water table dries up very quickly, and some wells cannot be used anymore. Digging deeper and pumping up water increases cost... Rainwater harvesting is very important to the cooperative, but funding for building the rain harvesting systems is a problem as not all farmers have access to subsidies. SWITCH helped us to improve the rain harvesting system...

“We are now using the underground space to plant mushrooms. The environment of the basement by the side of water storage pool is quite good for growing mushrooms in terms of temperature and humidity conditions. Using the ground space can save us lots of money in controlling growth conditions and gives us more benefits...

“Current challenges are on the technical design of the rainwater capturing system, the amount of land needed, and convincing the authorities (national and district) as well as the farmers to invest in these systems. Economic and financial calculations have shown that a certain amount of subsidy will remain necessary.”

*Ms. Zan, Director Huairou Cooperative, member of the Beijing SWITCH Working Group*

The Huairou district government has been convinced that mushrooms can be a promising product in the Beijing market and has designated mushrooms as one of the pillar agro-products for the Huairou district (one of nine experimental areas in the city). The Beijing Agricultural Extension Bureau (BAEB) aimed to increase RWH from the current one per cent of urban agriculture, to 3.5 million Mu (233,000 hectares) under greenhouses with RWH by 2010.

## Research

As already seen, higher level authorities in China require good scientific evidence if they are to be convinced there is a need to influence the central planning system. The first objective of the SWITCH programme “to contribute to the scientific basis for IUWM’ has been especially important in that respect.

One PhD student made an assessment of the potential of water sources and cycles at catchment level applied to greater Beijing area, and the potential of these different sources of water for productive uses (Li, 2009).

A second PhD student closely monitored the development, performance and up-scaling of a demonstration project in Huairou district. The research was highly participative. The PhD student was part of the working group, and with the project team and the most active members of the working group, jointly designed and adapted rain capture, storage and use in addition to aspects such as regulations, cooperative organisations, marketing and finance. Based on the research, guidelines and training material were developed on rainwater harvesting and treatment in Beijing (Cai and Ji, 2010).

The research with SWITCH is important in exploring limitations. For instance, the need to open the roof [in greenhouses] in the summer hinders the optimal capture and storage of rainwater. Research is also necessary to find the cost/benefits for different crops. Current research concentrates on mushrooms, but how investments in underground storage, for example, work out for other products like vegetables needs to be explored.

Findings on the potential of RWH have become the scientific basis for water saving, offering options to farmers and cooperatives, which can be fed into future Beijing and National Plans.

*Ms. Wang Zhi-Ping, Agricultural Extension Bureau, member of Beijing SWITCH Working Group*

These studies showed the potential of RWH for agricultural production, but also underlined the need for continued governmental support, not only with subsidies but also with legislation and other measures to improve productive uses such as agricultural production and agro-tourism.

Rainwater harvesting technologies themselves were not new. However, the combination of the technology, improved production, the cooperative organisational model and the institutional linkages amounted to innovation that led to financial savings on water and higher incomes. Working group meetings shared experiences from several RWH models. The PhD student identified a few problems regarding rainwater collection efficiency, or suitability for certain locations. These problems are being further analysed in the working group even after the end of the SWITCH initiative.

Research has not been truly demand-driven in that it was not jointly defined by learning alliance members. But it was to a large extent determined by the work already conducted by IGSNRR with the cooperative in Huairou, and does reflect the needs of local stakeholders: the cooperative, the Huairou District Agricultural Bureau and the Water Bureau. The research has to a large extent been participatory. The demonstration in Huairou was based on the idea of the cooperative leader, who is a true farmer innovator, while researchers and the farmer collaborated with other local stakeholders.

In 2008, research on urban agriculture and eco-sanitation were conceptually combined under SWITCH as decentralised (waste)water use. The objective was to combine findings on pollution prevention and reuse approaches and technologies to waste and stormwater handling in urban areas on a decentralised scale. Although there have been several exchanges of ideas and findings in the learning alliance, the combination of these topics has not followed through in research.

## Scaling up

Rainwater harvesting is a key resource in forthcoming years in Beijing and there is great potential for further development, since rainwater harvesting using greenhouses still accounts for less than one per cent of agricultural irrigation. Recent research in which SWITCH participated in six other districts of Beijing, confirmed the promise of the technology used in the demonstration in Huairou. Beijing Agro-technical Extension Centre and IGSNRR have patented the technology, and the Huairou and Beijing working groups want to continue their platform in other areas of Beijing.

Training sessions were organised in Beijing for research teams, working group members and selected authorities. The team developed a handbook in Chinese on rainwater harvesting for farmers and technical staff, covering RWH experiences in China, guiding the user in making choices and constructing the technology. Some of this material has been used by ETC and WUR, supported by Local Governments for Sustainability (ICLEI) to prepare training and for a SWITCH training manual developed by ICLEI. A website (in Chinese) was established at <http://switchurbanwaterbeijing.y02.cn>. However, it has not been kept up to date.

SWITCH Beijing further enhanced and stimulated the network on urban agriculture in Beijing. The Chinese Urban Agriculture Association network also operates at national level and is expanding to other cities including Shanghai, Chengdu, Nanjing and many more. Established in 2006 with the help of RUAF and IGSNRR, it acts as the national platform for exchange experiences among more than 20 Chinese cities, universities and national agencies.

The Beijing network increasingly operates as a national network. Firstly, because the Beijing team is involved in National Policy influencing (five year development plan, etc.), and secondly, because many other cities are asking to become members of RUAF China. National recognition will be official soon.

*Ms. Liu Junping, Beijing Rural Economic Research Centre, Chair of the Beijing Platform on Urban Agriculture*

Further efforts to scale up the SWITCH approach were undertaken at international conferences such as the Sustainable Water Infrastructure for Cities and Villages of the Future (SWIF) conference in 2009 and at the 2010 EU week at the Shanghai World Expo.

Good publications on the research and demonstration, especially those showing the (potential) impacts and developing scenarios, are key inputs for decision-making at higher levels. Seven papers have been published in Chinese high quality journals. Members of the learning alliance participated in international scientific meetings and workshops, and there are plans to develop a scientific community and student network working on IUWM. The work in China has been highlighted on German radio and in the UK magazine the New Agriculturist.

IGSNRR is one of the founders and key actors of the Urban Agriculture Association of China, which is very active nationwide in promoting sustainable urban agriculture. IGSNRR also coordinates the Centre for Water Resources Research of the Chinese Academy of Sciences and has setup a joint research centre on water issues with the Australian Academy of Sciences. A number of international research initiatives on urban water issues are under way and some will build on the SWITCH contribution, just as SWITCH built on what was there before.

## Conclusions

The research and demonstration project in Beijing has stimulated the use of available and ongoing research relevant to water-related problems in Beijing. Innovations were made not only in terms of technology and improved production but also in the cooperative organisational model and new institutional linkages. They supported moves towards saving water and higher incomes for farmers. Finding the best RWH technologies and models for Beijing and supporting their uptake is an important issue, and efforts to scale up the results of the demonstration and research are promising.

Given the limited budget in the project, the visibility of SWITCH Beijing is in fact quite outstanding. Its demo results have been already directly implemented by the local government and the special office in Beijing for RWH. SWITCH Beijing and the special office even applied a patent for these RWH techniques. It is foreseeable that in the coming years, a large up-scaling of this technique will occur in Beijing.

*Mr. Cai Jianming, IGSNRR, SWITCH City Coordinator*  
*Mr. Ji Wenhua, IGSNRR, SWITCH PhD Student*

SWITCH built upon experiences of the existing network on multi-functional agriculture in peri-urban development, facilitated by RUAF China with IGSNRR. In return, SWITCH Beijing further enhanced and stimulated the network on urban agriculture in Beijing.

SWITCH was only able to complete part of its original aims. The shift of the work on eco-sanitation out of Beijing was a major setback, both in integration and in the loss of involvement of key stakeholders. Delays in strategic planning under SWITCH and in learning alliance development confused and delayed the process by at least one year. On the other hand, the work on water for urban agriculture, as well as the experience of IGSNRR in facilitating these processes, made it possible to develop a China-specific approach. SWITCH in China has made optimal use of the Chinese approach to experimentation, showing the potential of new sources of water to contribute to the water scarcity in the city and its surroundings.

From its start in 2008, the demonstration project showed positive results providing high quality irrigation water and increasing farmers' income substantially. Local government, in the form of the Municipal Agricultural Extension Centre in Huairou District, participated in the working group, acknowledged the results and supported the further application of the technology. The results have already been integrated into ongoing policies and into the 12th five-year plan (2011-2015) where more effective water use and management has been encouraged including the rainwater harvesting both in urban and peri-urban areas.

The discussions and approach generated by SWITCH links very well to the work and mandate of the Water Authority. For instance, the visioning exercises and discussions about different scenarios could be linked to those developed by the Water Authority itself. This has improved planning by the Water Authority.

The combined effort with the Agricultural Bureau (AB) in water saving using rainwater, and mapping the potential of RWH compared to the potential of reuse of treated wastewater, is a great achievement.

*Ms. Zhang Tong, Chief Engineer, Beijing Municipal Research Institute of Water Planning*

In 2001, the Chinese State Council announced that using rainwater is a key measure to relieve severe water scarcity, but policies were missing for the peri-urban areas of Beijing. The Beijing Municipal Agriculture Bureau and the Beijing Water Authority now join hands. The SWITCH-Beijing programme aided this development.

# Recommendations

There were considerable successes through SWITCH in Beijing, but despite international conferences, they remain relatively unknown outside of China. If there are avenues to further write up the processes they should be taken. Guidelines and training materials for other farmers still need further development. IGSNRR should seek to finalise and publish the drafts which have already been developed.

Material could be also used to develop a specific policy brief on the experiences of SWITCH China in decentralised innovation development and inter-institutional collaboration.

Although it functions informally, the city level working group on water for productive agriculture will continue to need facilitation if it is to survive the end of SWITCH. Linkages between the Agricultural Bureau and the Beijing Water Authority are crucial in further up-scaling. IGSNRR should take steps to institutionalise and promote the strong position it has achieved as well as those of the main institutions (the Cooperative, the Agricultural and Water Bureaus). IGSNRR should seek to extend their experiences to other dry areas of Northern China.

## Acronyms used in this chapter

AB	Agricultural Bureau
BAEB	Beijing Agricultural Extension Bureau
CAS	Chinese Academy of Sciences
ETC (Foundation)	Netherlands-based NGO supporting countries’ development of food security, water, energy, health care and education
ICLEI	Local Governments for Sustainability
IGSNRR	Chinese Academy of Sciences
IGSNRR-CAS	Institute of Geographic Sciences and Natural Resources Research – Chinese Academy of Sciences
IUWM	Integrated urban water management
NGO	Non-governmental organisation
RUAF (Foundation)	Resource Centres on Urban Agriculture and Food Security
RWH	Rainwater harvesting
SWIF	Sustainable Water Infrastructure for Cities and Villages of the Future (SWIF)
WUR	Wageningen University and Research Centre

## References

Beijing Water Authority, 1997 *Beijing water resources bulletin 1999-2008*.

Beijing Municipal Bureau of Statistics, 2009. *Beijing statistical yearbook 2009*.

Cai, J. & Ji, W., 2008. *Adapting to Water Scarcity: Improving water sources and use in urban agriculture in Beijing*. *Urban Agriculture Magazine*, 20.

Cai, J. & Ji, W. 2010. *A Handbook on Beijing's Rainwater Harvesting Technology of Greenhouse Agriculture* (Training materials for SWITCH-Beijing LA).

Ji, W., 2010. *Optimization and Management of Rainwater Harvesting and Reusing – A Case Study of Beijing* (PHD thesis).

Ji, W., Cai, J. & van Veenhuizen, R., 2009. *Diversification of water sources and more efficient use in urban agriculture in Beijing*. In: *SWITCH scientific meeting Oct 2009*. Delft: The Netherlands.

Ji, W. & Cai, J., 2008. *Adapting to Water Scarcity: improving water sources and use in urban agriculture in Beijing*.

Ji, W. & Cai, J., 2008. *New water source for urban agriculture – rainwater harvesting demonstration in Huairou, Beijing*. In: *SWITCH scientific meeting 30 Nov-4 Dec 2008*. Belo Horizonte, Brazil.

Ji, W., Cai, J. & van Veenhuizen, R., 2010. *Potential Estimation of Rainwater Harvesting by Roofs of Residential Areas in Beijing*. *Resources Sciences*, 2.

Ji, W. & Cai, J., 2010. *Efficiency and Economy of a New Agricultural Rainwater Harvesting System*. *Chinese Journal of Population, Resources and Environment*, 8 (2).

Ji, W. & Cai, J., 2010. *Optimization of the scale of greenhouse agricultural Rainwater Harvesting and utilization project*. *Transactions of the CSAE*, 26 (8).

Ji, W., Cai, J. & He, 2010. *Potential Estimation of Rainwater Harvesting by Roofs of Residential Areas in Beijing*. *Resources Sciences*, 32(2):282-289.

Ji, W. Cai, J., Wang, K. & van Veenhuizen, R., 2010. *Cost-benefit analysis of a typical model of agricultural rainfall harvesting based on a demo-project in Beijing*. *Academic Journal of China Agriculture University*, 15(1), pp. 99-105. [Online] Available at: [http://en.cnki.com.cn/Article\\_en/CJFDTOTAL-NYDX201001019.htm](http://en.cnki.com.cn/Article_en/CJFDTOTAL-NYDX201001019.htm) [Accessed 09 April 2011].

Li, J., 2009. *Study on Water Scarcity, its Risk Assessment and Management in China* (PhD thesis).

Li, L. & Li, J., 2009. *Water Issues in Beijing-Tianjin-Tangshan Region*.

Liu, Yao & Gao, 2003. *Analysis on change trend and driving forces of water using structure in Beijing*. *Resources Sciences*, 2003 (2), pp. 38-43.

Scholes, L. & Shutes, B., 2008. *Catalogue of Options for the Reuse of Storm water*. *SWITCH*. [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/W2-2\\_GEN\\_RPT\\_D2.2.1b\\_Catalogue\\_of\\_options\\_for\\_reuse\\_of\\_stormwater.pdf](http://www.switchurbanwater.eu/outputs/pdfs/W2-2_GEN_RPT_D2.2.1b_Catalogue_of_options_for_reuse_of_stormwater.pdf) [Accessed 09 April 2011].





part 3

# Guidelines

SWITCH graffiti by students on the walls of the Anne Frank School, Belo Horizonte, Brazil. (Photo credit: John Butterworth)



# 3.1

Drilling for groundwater in Alexandria city, Egypt. (Photo credit: Cedare)

## Starting a learning alliance

Mike Morris and John Butterworth

*How can you engage stakeholders more effectively in change? How can you put new solutions into practice more effectively? A learning alliance may help to find some of the answers to these questions. Learning alliances provide a means to tackle difficult problems jointly. The SWITCH project promoted and used learning alliances to encourage the scaling-up of innovations in sustainable urban water management. The vision was a far-sighted and integrated approach, looking to the city of the future and to all aspects of the urban water cycle. This guideline considers why a learning alliance can be a useful form of stakeholder engagement and how to start the learning alliance process. It includes examples from the SWITCH experience that could be instructive.*

### Key concepts

<i>Learning alliances</i>	A grouping of constituent individuals and organisations with a shared interest in innovation and taking innovation to scale, in a topic of mutual interest.
<i>Innovation systems</i>	The activities and interactions within and between groups of actors, and the rules governing them that collectively determine how innovation takes place.
<i>‘Wicked’ problems</i>	‘Wicked’ problems is a term coined by Rittel and Webber in 1973 to describe problems that are ill-defined, ambiguous: “the wickedness of the problem reflects the diversity among the stakeholders in the problem”. There is often little consensus about what the problem is, let alone how to resolve it. These problems cannot be successfully treated with traditional linear, analytical approaches, because they are part of complex, interacting issues that evolve in a dynamic social context. Often, new forms of wicked problems emerge as a result of trying to understand and solve one of them.
<i>Integrated urban water management</i>	IUWM is the practice of managing freshwater, wastewater, and stormwater as components of a basin-wide management plan. Integration of different elements of the water cycle and coordination between different stakeholders is seen as key to innovation and to finding more sustainable and effective solutions to urban water management.

*Double-loop learning*

While ‘single loop’ learning is compared to learning the rules, double loop learning is compared to changing the rules, out-of-the-box thinking and reflecting on why the rules do not work. Double-loop learning involves a process of reflection, testing and re-adjusting your values, behaviour and underlying assumptions (Argyris & Schön 1978).

## Introduction

The idea of learning alliances has evolved in response to the perceived widespread failure of much conventional research to have significant impact (Moriarty *et al.*, 2005; Smits *et al.*, 2007; Verhagen *et al.*, 2008). It has also developed in recognition of the fact that new products are brought into use and change processes are initiated, not just by the activities of researchers, but by a number of widely different actors and organisations. This is particularly true in urban water and sanitation management (see Box 3.1.1). Interconnected players in cities typically include public sector line ministries, utilities, regulators, educators, and research institutes, private sector industry and financial services and civil society players such as NGOs, media, professional bodies, unions, and advocacy organisations.

### **Box 3.1.1 Why learning alliances for cities on urban water management**

Cities around the world are facing a range of dynamic pressures including rapid urbanisation and urban sprawl, industrialisation, climate variability and climate change. The ecological ‘footprints’ of cities are growing through increasing exploitation of available resources – land, water, energy, food, building materials, finance – while they produce massive streams of waste (solid, gaseous, liquid), contaminating soils, air and water. Conventional urban water management meanwhile, is struggling both North and South to manage water resources, to deliver water and sanitation services and to dispose of wastewater without adversely impacting the quality of life of urban populations and the downstream environment. Put bluntly, urban water management faces extraordinary and complex problems, in which solutions to problems in one part of the system may create new problems elsewhere for others. The challenge to finding sustainable solutions – economic, environmental, social and institutional – to these ‘wicked’ (Rittel and Webber, 1973) problems is beyond the realm of conventional research approaches and requires a new paradigm.

The activities and interactions within and between such groups, and the rules governing them, can collectively be referred to as an innovation system, the framework that gives rise to the development and diffusion of technologies and facilitates – or inhibits – the scaling up of innovation. SWITCH learning alliances were groupings of constituent organisations from innovation systems, seeking to take relevant innovation to scale. These groupings are sometimes called platforms – with the idea that stakeholders who come together are ‘equal’ or on the same level.

As a tool or mechanism, a learning alliance can provide a key for engaging multiple stakeholders and bringing together their diverse perspectives on a problem and its potential solutions, and enabling new ways of working to emerge. In dispersed or complex systems like urban water management, learning alliances may be represented by sets of connected stakeholder platforms typically located at the different levels of administration (e.g. national, city, and neighbourhood). Their structure and activities will be designed to optimise relationships, breaking down barriers to learning both horizontally (across platforms), and vertically (between platforms). Learning alliance members should share a common desire to address an underlying problem such as (in the case of SWITCH) to improve urban water management. They ought also to share or seek to develop common approaches – visions, strategies and tools – on how this can be achieved. Each platform groups a range of stakeholders that captures diversity and brings together complementary skills and experiences. In essence, a learning alliance is about new ways of working together to address common problems, and the decision to set up a learning alliance represents a commitment to create, change or build on relationships that have not worked, or perhaps not existed, in the past.

A learning alliance can only flourish if there is a shared sense of the need to tackle a problem or set of problems. It is a method for engaging people and institutions and focusing their attention on a common analysis of problems and search for solutions. The initiative at least requires recognition that problems exist and solutions are required. SWITCH learning alliances had a structure and organisation but no statutory powers beyond the power of persuasion. These groupings comprised individuals and bodies that actively wanted to contribute to a process of joint exploration, learning and implementation. They were, and are, coalitions of the willing. In SWITCH, as elsewhere, the more representative the alliance, the better it captures the organisational complexities that constitute the realities of the innovation system.

**Box 3.1.2 A vision for learning alliances in SWITCH**

It is worth thinking about and asking what will future learning alliances look like? At the start of the project, SWITCH identified that:

- After 6 months some city learning alliances will have a management team headed by a locally endorsed coordinator, and will enjoy reasonably effective and networked communications; one or two may even have created their own website (using the SWITCH platform). Inception meetings will have been held, and funding for a number of action research projects acquired. Some of these activities will have been commissioned, and newly formed partnerships between members will be initiating this research. In-house expertise, capacities and skills of the membership will have been mapped, and posted on the website. Initial 'outcome mapping' plans will have been developed by the management team, identifying key UWM stakeholders (non-members) who the alliance will seek to influence.
- After 5 years, we envision active city learning alliances in all SWITCH demonstration cities are linked to a global learning alliance, involving not only the SWITCH consortium but also other cities and stakeholders working to scale-up innovations introduced by the SWITCH project.

In practice, these time frames were optimistic in most cities and in some cases it took 24 months to establish a functioning alliance. Some of this was due to problems within SWITCH in allocating resources and recruiting and training facilitators. Although some of these delays could have been avoided, the establishment of a learning alliance may take twice as long as expected.

A learning alliance should not be just a discussion group but a practical body that seeks to apply research to pressing real-life problems. An important first step therefore is to ask why you want to engage stakeholders and why you are interested in a learning alliance approach. In SWITCH it was because of the perceived need to better engage a wide range of stakeholders in research at an early stage so that research could generate integrated solutions across the urban water cycle that could ultimately be put into practice (see Box 3.1.2).

In practice, differing views existed within the research consortium regarding the purpose of learning alliances and what they would look like in the different cities (see Box 3.1.3 for an example of the range of views).

In the early stages of the project, the different stakeholders within the SWITCH research consortium had different understanding of what learning alliances might look like and their main purpose. One view (mainly coming from social scientists) was that learning alliances were multi-stakeholder platforms for identifying research priorities and bringing new knowledge to bear on problems relating to IUWM. Another view (mainly coming from professionals with strong commitment to a holistic, sustainable and futuristic water management paradigm) was that learning alliances are a vehicle for promoting awareness

and understanding of IUWM, and for galvanising commitment to it by key stakeholders. A third perspective (mainly of researchers promoting particular water related technologies or models) was that learning alliances are a potential vehicle for promoting and up-scaling promising technologies, knowledge and planning models. A fourth perspective (mainly from city service operators, regulators and planners) was that learning alliances provided an opportunity for cities to interact with local and international researchers and a neutral forum for them to meet with other stakeholders within the city and safely air views and explore a longer term vision of what IUWM in the city of the future might look like.

In any learning alliance, stakeholders' interests and motivations for committing their time will differ. Understanding and managing expectations will help to get and keep stakeholders on board in the alliance process. Experience from SWITCH also points to the importance of identifying tangible incentives for continued collaboration.

City learning alliances were intended as a mechanism for planning, undertaking and learning from action research, undertaken together by various kinds of implementing agencies and by researchers. It was intended that this range of stakeholders would, together, identify barriers to implementation of new solutions early and overcome them. Without a focus on implementation, then aspects like cost, financing, operation and maintenance, user behaviour, impact on marginalised groups and management requirements risk being forgotten. Box 3.1.3 presents the main ideas underpinning the learning alliance approach in SWITCH.

**Box 3.1.3 Ideas underpinning the SWITCH learning alliance approach**

The SWITCH learning alliance approach is based on an understanding that:

- Switching the emphasis from researchers devising new technologies (doing different things) to improving how the multiple stakeholders in the innovation system work (doing things differently) leads to interventions having greater impact.
- Innovations that are generated locally, taking all relevant stakeholders into account, are more likely to lead to appropriate and sustainable solutions, to promote flexible and adaptive working practices, and to foster and strengthen the development capacity of local organisations and communities.
- Knowledge should be viewed as a complex, transformative process, arising less from an accumulated stock of information, and more from intra- and inter-organisational processes in which experimentation – action research – and communication feature strongly.

## What is the best way to start a learning platform?

If learning alliances provide a means to jointly solve difficult problems, first one has to establish that key stakeholders agree that there are underlying problems in a certain area. They may understand these problems in different ways and believe in different solutions, but there have to be reasons (e.g. crises, responsibilities, mandates, potential benefits) for each of them to seek resolution of the problem. Members of the SWITCH city learning alliances for example were agreed on, or at least interested in, the widespread failings of conventional urban water management and aspired to an integrated urban water management (IUWM) that was more sustainable, less risk prone and more equitable. Many shared an interest in novel approaches, such as ways to close the urban water cycle, looking at waste streams as potentially valuable resources and more environmental friendly naturally-inspired approaches. Members were also receptive to the idea that the current sector was fragmented and that it was necessary to find way to come together to better share information, plan jointly and collaborate on more integrated approaches.

However useful a learning alliance might become and however urgently such a step is needed, the process of bringing stakeholders together is unlikely to happen spontaneously. As with any group activity, momentum for a new enterprise is often provided by one or two key individuals, with backing from their superiors and organisations. To set up a learning alliance every SWITCH city identified a coordinator to champion the alliance, and an individual specialist facilitator or team of enthusiastic co-workers to support the coordinator. In addition, there is a need for at least one city or national organisation to host the learning platform; i.e. to provide the initial support, space and resources needed by the coordinator to initiate and progress the learning alliance. It is preferable, although not essential, that this should be the coordinator's own organisation or institution.

To kick off the learning alliance, the coordinator and colleagues should identify and contact the different types of stakeholders with interests in the issue (see chapter 3.2 for an example of stakeholders in urban water management). The term stakeholders here refers to individuals, groups or organisations, who have an interest in, have influence over, or who are, or might be, affected by the issues and/or by attempts to address them. Initially, it is likely that only a few will be interested enough to join the learning platform, and the coordinator and new membership will subsequently have to draw up engagement strategies for building and fostering relationships with others, either by recruiting or co-opting them or at least by influencing them.

Having scoped the stakeholder community and secured favourable responses from a sufficient number of stakeholders, the coordinator must organise a meeting to bring them together. Whether this is considered an inception meeting for the learning alliance, or precursory meeting(s) to its launch, depends on the dynamic of the local discourse and the context of the city. A preliminary meeting provides the first collective opportunity for the coordinator and facilitator to share the project's aims, and introduce the learning alliance and its underpinning concepts, and for stakeholders to critically discuss the challenges of an area, identify potential ways forward (e.g. opportunities for action research), and indicate potential contributions (i.e. skills and resources).

More important than any particular agenda for these meetings will be the need to effect local buy-in and ownership of the process by a critical number of diverse local stakeholders. Local ownership here must not however be misconstrued to allow 'hijacking' of the process by an elite or the establishment of a cartel. Learning alliances have to be inclusive if they are to successfully address and improve the way a system works. To this end the coordinator will need to have significant facilitation skills, or to commission a facilitator. Unless the coordinator is very confident in this respect, it is almost always better to separate the role of facilitator, to bring in specialist skills and to allow the coordinator to focus on her or his main function.

Whether formally or informally constituted, a city learning alliance (or platform), will need to endorse the role of the coordinator (or select another) and that of a small supporting secretariat or management team, who together will be charged with taking action points forward. Box 3.1.4 presents key issues relating to membership and management of the learning alliance process.

### Box 3.1.4 Planning a learning alliance process

Issues that the membership and its management team will need to consider at an early stage could include:

- How formal will the learning alliance membership be – how are members admitted (or not)?
- How are alliance activities to be funded, and how will costs and benefits be shared?
- How will the alliance communicate and share information and ideas with each other (workshops, reports, e-mails, text messages etc)?
- How will the membership's capacity and training requirements be assessed and addressed (particularly in the sphere of action research and ICTs)?
- How will a comprehensive mapping of UWM stakeholders be undertaken?
- What research activities will the alliance commission; who should undertake these and how?
- How will inter- and intra-organisational learning (e.g. double-loop learning) be assured?
- How will the alliance engage with influential stakeholders outside the alliance?
- How will the alliance (or management team) draw upon the support available?
- How will the alliance monitor and evaluate its performance generally and the activities of the management team (and of the support provided)?
- How will processes be documented to ensure that learning is optimised, and is made available to share with other city learning alliances?

Some of the answers to these questions may be written down in the form of rules or an agreement on how the learning alliance will function.

## How big will the alliance be and who will be involved?

Initially small (perhaps with representatives from as few as a dozen, but more usually two dozen organisations), the city learning platforms in SWITCH were anticipated to grow over time, both as new stakeholders were contacted and as the activities of the alliance were undertaken and promoted. To be an effective microcosm of the wider innovation system, membership of an alliance should include representatives from diverse user groups and communities, public and private service providers, regulators, policy makers and legislators, and researchers, together with documenters and disseminators.

From a functional perspective, expertise and costs also play a part in determining the size of particular events. Management capacity and effectiveness of workshops above a certain size, for example, may be a limiting factor, although electronic networking allows for higher numbers.

Public sector and civil society organisations tend to be more readily available to attend stakeholder or participatory meetings. Poorly represented or marginalised civil society groups (e.g. ethnic minorities, poor women and children etc) may feel intimidated by the scale and activities of certain gatherings, and proactive initiatives may need to be taken to ensure their representation and fullest participation. Private sector players are typically more conscious or critical of nominally unproductive activities, and often find it more difficult to engage. Their clearer focus on a single bottom line – profit – can however provide fresh momentum and the rationalisation of alliance activities.

It is important that organisational stakeholders are represented by dynamic individuals, with decision-making potential and/or access to key decision-makers. This is particularly significant with public bodies where improvements to the system require that bureaucratic constraints are addressed. It is important that the same representatives attend and take part in the activities, to ensure continuity.

## What should the learning alliance be called?

The name of the learning alliance may seem a trivial question. The body needs local ownership and buy-in and therefore the members of the alliance should decide what it is called. Some bodies of this type are known as learning alliances and some are known as learning platforms. However, not all stakeholders accept from the beginning that what they doing is learning. In Beijing it was not appropriate to bring high level people to learn together with those with a lower position. In Tel Aviv it was more productive to call the alliance a Water Club as that did not threaten any existing hierarchies. The name is less important than the building of a group with clear objectives and a focus on action-oriented research. The learning alliance is an approach, not a brand.

If the innovation system is viewed as the city, this would suggest the use of the term learning alliance for groupings at the city level. If the system is associated with the catchment or with IUWM in general (i.e. a conglomeration of cities) then each city-level grouping might more aptly be termed a learning platform and be part of a wider learning alliance. More important than the terminology however, will be recognition of – and ultimately engagement with – key ‘outside’ stakeholders (e.g. at national or catchment levels), and seeking and sharing lessons between cities.

## Where will funding for the alliance come from?

A significant commitment of time and effort is incurred during the setting-up phase of a learning alliance or knowledge network, a process that typically may take as long as 12 to 36 months before it also becomes really effective. It also requires finance for the facilitator, for workshops and communications. Lack of funds during this period is likely to scupper the establishment of a locally-driven, fully functioning alliance. SWITCH used some of its own resources to prime a number of alliances and/or complement locally raised funds; finding further funding and establishing cost sharing arrangements were key early activities.

The objectives of the SWITCH city learning platforms were developed in line with those of the statutory authorities and other stakeholders with interests in urban water management, including donors in developing countries. Learning alliance activities contribute to and facilitate the ability of several urban water management stakeholders to meet their responsibilities. This situation allows for and encourages quid pro quo arrangements – indeed membership of the SWITCH alliances was on the basis of joint sharing of costs, through staff time, facilities and other resources, as well as sharing the benefits.

Direct funding opportunities can also be explored and finances sought for the set up and running costs of the alliance, or for specific research activities. Commissioning action research to be expressly undertaken by member organisations in partnership arrangements is one way to ensure new ways of working are actively explored and to provide incentives for the participation of less well resourced stakeholders, such as civil society organisations.

## What kinds of skills and support might be required?

The main assets of a learning alliance are trust and mutual respect. For stakeholders to attend in the first place they must feel that this is a place where they will be safe; to continue to come they must feel that the alliance is effective and brings benefits. As the different stakeholders may initially have relations with each other that are distant or even have some mutual suspicions, the coordinator and facilitator must create a climate where stakeholders learn to work together.

### Box 3.1.5 What facilitation does a learning alliance require?

- In SWITCH the time and resources in each city team varied and the results did too. The total budget in each city for stakeholder engagement focused activities averaged around 25,000 Euros per year covering staff costs and expenses such as costs of workshops, communications and publications, but with more substantial separate budget lines for research and demonstration costs. Time for facilitators varied between 1 day per month (which proved grossly inadequate) to almost a full time post. Some cities deployed senior staff in this role and others juniors or staff with little similar experience. Few cities were able to allocate staff with specialist documentation skills in addition to facilitators.
- In Accra, the alliance had a steering committee with membership from the implementing partners in that city (IWMI, KNUST and a local NGO, TREND). The City Coordinator from KNUST was allocated 3 days per month. The learning alliance facilitator was hired by the same institute working for 10 days per month and assisted by an assistant facilitator who was allocated 18 days per month so totalling a little over one full time equivalent. The facilitator received training in the development and facilitation of a learning alliance, process documentation and monitoring.
- In Lodz the city Alliance facilitation team was gradually built from May 2006. The facilitator was allocated 40 hours per month and worked closely with the City Coordinator and researchers. Supporting staff was contracted for specific services. In 2009 the team was strengthened with an additional staff member who focused primarily on updating the weblog, organizing press articles and project documentation.

The co-ordinator needs to be able to inspire potential stakeholders to join the process of building a common vision and action research programme, and is responsible for ensuring that there is both a clear sense of purpose and direction and local ownership and buy-in. The co-ordinator will also be responsible for helping to ensure that the funding is secure, that research and learning are conducted effectively and that new stakeholders are drawn into the process, including those at risk of being excluded or marginalised.

The facilitator plays a key role in these processes, notably in ensuring that meetings are well prepared and conducted so that everyone is able to contribute without the process being taken over by a small group of more vocal or powerful stakeholders. The facilitator also plays an important role in liaising with stakeholders between formal meetings and ensuring that they are satisfied with the process, anticipating and resolving difficulties.

Experience from SWITCH and other projects with learning alliances shows that support and capacity building are essential. Within the SWITCH project, a support team lent conceptual and practical support to city coordinators and their teams. This included workshops on the concept of learning alliances and facilitation skills. Distance-support in the form of written responses to questions or instructions on specific matters, including briefing notes was also provided. A certain level of ongoing support is needed, depending on the prior experience of the city teams in facilitating participatory processes and multistakeholder platforms. Within SWITCH, the support team made city visits for discussions with coordinators and the management team, and presentations to city stakeholders when requested. Training inputs and materials have been made available, particularly with respect to developing the skills of city teams in process documentation and extending the ICT capacity of the alliance membership. The support team also worked closely with the city alliances to increase mutual understanding of institutional learning and change processes.

### Box 3.1.6 Possible skills required by coordinators and facilitators

- Integrity and openness – with the ability to create a working environment with trust
- Efficiency, energy and competence so that the learning alliance delivers what it has promised
- Lack of bias – it is essential that the coordinator and facilitator are seen as being ‘fair’ and open to new ideas
- A sense of positivity and purpose – to ensure that stakeholders feel that their time is well spent and worth the effort
- An ability to draw out those who find it difficult to speak, and to persuade those who speak too much to learn to listen!
- Sensitivity to unspoken resistance that exists in many meetings
- An ability to interact with and encourage different kinds of people, from those with powerful positions to those who have a stake in the outcome but rarely are given a voice
- Perseverance and determination

## Summary

This section has introduced the concept of the learning alliance and how it links research to action, especially in terms of harnessing the energies of key stakeholders to work together on common problems, to find out how to tackle issues in different ways and to spread innovation. It has emphasised the need for a clear sense of purpose, and explained some of the concepts that underpinned the SWITCH learning alliance initiative.

The reader should now have some idea of why a learning alliance would be useful and how to plan and start one. The first step is to find a host and to create a small core team to decide who should be approached as an initial group that can develop into a full blown alliance. The importance of finding sources of finance and agreeing on contributions in kind from stakeholders (office space, staff time *etc.*) has been emphasised. The need to recruit a coordinator and facilitator has been explained together with their (ideally superhuman) skills.

For the learning alliance to be innovative and change-oriented, it has been emphasised that stakeholders involved in a learning alliance should be heterogeneous in terms of roles, values, backgrounds, perspectives and interests. It is important to move beyond circles of 'old friends' or stalemates between 'old enemies'. Careful facilitation is needed in order to foster a shared vision and sense of purpose for the alliance and to ensure that marginalised groups or their representatives are involved in consideration of problems and solutions.

### Box 3.1.7 Tips and tricks

- Be clear at the outset on why you want to promote stakeholder engagement and what you expect a learning alliance to achieve.
- Identify appropriate coordinating and facilitating skills, and an appropriate host organisation for the learning alliance.
- Think about all the stakeholders that ought to be involved, but start small and involve more stakeholders as interest in the activities of the learning alliance develops.
- Find ways to share costs and to fund start-up costs and learning alliance activities.
- Organise a mix of activities, from bi-lateral meetings, working groups and discussions, social events and media events to workshops with all learning alliance member.
- Think from the onset of the project about a strategy for reaching a wider audience of stakeholders, including those with decision-making power at higher institutional/ administrative levels.
- Design a strategy and allocate resources for documenting the process and a strategy for monitoring progress and results.
- Try to understand incentives for different stakeholders to engage in collaborative research and contribute time and resources to the learning alliance.
- Focus on the institutional context for uptake of innovations developed and financial and managerial implications of these innovations.

### Acronyms

ICT	Information and communications technology
IUWM	Integrated urban water management
IWMI	International Water Management Institute
KNUST	Kwame Nkrumah University of Science and Technology
NGO	Non-governmental organisation
TREND	Training, Research and Networking for Development

### References

Argyris, C. & Schön, D., 1978. *Organizational learning: A theory of action perspective*. Addison Wesley: Reading, Massachusetts. See also: Argyris, C., 1977. Theories of action, double-loop learning and organizational learning. [Online] Available at: <http://www.infed.org/thinkers/argyris.htm> [Accessed 19 April 2011].

Moriarty, P., Fonseca, C., Smits, S. & Schouten, T., 2005. Learning Alliances for Scaling Up Innovation Approaches in the Water and Sanitation Sector (Paper to ESRC Seminar on Water Governance – Challenges and the Consensus, 27-28 July, The Hague). [Online] Available at: <http://splash.bradford.ac.uk/files/PDF%20Moriarty,%20Fonseca,%20Smits%20and%20Schouten%20seminar%203%20paper.pdf> [Accessed 15 February 2011].

Rittel, H. & Webber, M., 1973. Dilemmas in a General Theory of Planning. *Policy Sciences*, 4, pp. 155–169.

Smits, S., Moriarty, P. & Sijbesma, C. eds., 2007. Learning alliances: scaling up innovations in water, sanitation and hygiene (Technical paper series/IRC, no. 47-E). IRC International Water and Sanitation Centre: Delft, The Netherlands.

Verhagen J., Butterworth J. & Morris M., 2008. Learning alliances for integrated and sustainable innovations in urban water management (Proc. 33rd WEDC International conference, Accra, Ghana). *Water Lines*, 27 (2), pp. 116-124.

### Related websites and further reading

The 'Theory into Practice database': <http://tip.psychology.org/index.html> [Accessed 19 April, 2011]. This database contains brief summaries of 50 major theories of learning and instruction.

The Multistakeholder Processes and Social learning portal of Wageningen University: <http://portals.wi.wur.nl/msp/?page=1287> [Accessed 19 April, 2011]. This portal contains useful resources on stakeholder analysis and other elements relating to stakeholder engagement and joint learning.

Röling, N., 1986. Extension Science: Increasingly preoccupied with knowledge systems. *Sociologia Ruralis*, 25, (3/4 1985), pp. 269-290. This paper gives insight in the history of research, extension and uptake of innovations in the agricultural sector, and the lessons learnt. One of the most accessible and least abstract papers written on knowledge systems.



*In order to successfully engage the right stakeholders, it is important to understand what they do, what motivates them and how they view their working environment. This chapter focuses on identifying stakeholders, their respective roles, interests and relationships. We outline steps for developing an understanding of stakeholders and their relationships as well as their multiple (often conflicting) views, interests, and objectives. Stakeholder analysis is a participatory exercise which, if done at the start of an intervention, can identify factors that could facilitate or inhibit change and will help contribute to the process of joint problem solving.*

## Key concepts

### *Focus group discussion*

A moderated discussion aimed at getting a more detailed understanding of a topic. Focus groups usually consist of 6-12 people who are knowledgeable about the specific topic at hand or have a specific interest in it. Participants should be roughly of the same socio-economic group or have a similar background in relation to the issue under investigation. The age and gender composition of the group should facilitate free discussion.

### *Enabling environment*

The enabling environment consists of public institutions, policies and regulation, social, economic and environmental factors which influence the performance of organisations and individuals.

### *Key stakeholders*

Those actors who are considered to have significant influence on the success of a project.

## Introduction to stakeholder analysis

The objective of this chapter is to provide guidelines for learning alliance coordinators and facilitators and their core team to carry out a stakeholder analysis. The purpose is to identify the key stakeholders - those with the greatest stake in urban water management –and all those you may be interested in inviting to join a learning alliance. This process includes participatory analysis in meetings and workshops with single or multi-stakeholder groups. Stakeholders themselves identify who is important to include and

# 3.2

## Stakeholder analysis

Joep Verhagen, Mike Morris and John Butterworth

Mapping stakeholders in Accra, Ghana. (Photo credit: Carmen da Silva Wells)

begin to define their own relationships with each other. In taking these preliminary steps they are improving their understanding of their own place within the innovation system that is their area of interest, and the place and influence of others. Stakeholder analysis is the equivalent of drawing a map showing the major features in a landscape.

In the previous chapter we saw that stakeholders have an interest in or influence over the area of interest, and also include those who are, or might be, affected by the issues and/or attempts to address them. Stakeholders can be groups of people, organisations, institutions or even individuals. Box 3.2.1 presents key stakeholder types in urban water management.

**Box 3.2.1 Who are stakeholders in urban water management?**

Stakeholders are individuals, groups, or organisations who have an interest in, or are affected by, the issues and/or attempts to address them, such as:

- Key organisations responsible for water management functions in each demonstration city. These include organisations that make decisions or affect changes in policy and practice including policy analysts and advisors, policy makers, municipal/local government personnel (political & bureaucratic), service providers (public, private & community), regulatory authorities *etc.*
- People with influence with decision-makers (e.g. members of parliament, private sector companies);
- Civil society organisations and individuals who can bring pressure to bear on decision-makers (e.g. NGOs, unions, professional associations *etc.*);
- Water user groups (e.g. consumer groups, irrigation groups *etc.*);
- Local 'leading lights' (activists or champions) working to address poverty, gender, environmental issues *etc.*;
- Those who can support, reinforce and strengthen SWITCH activities and recommendations (e.g. training and research organisations, financial organisations *etc.*);
- Those in the media who provide a means by which the learning alliance can reach the public; and
- The donor community, who can further finance and support SWITCH's activities.

The area of interest is connected with the goal or long-term objective of a project or initiative. In the case of SWITCH it was integrated urban water management (IUWM). A city learning alliance also has a natural geographical focus. However linkages to the national, catchment or international level may also be considered appropriate. Where the alliance is part of a wider initiative or project, attention may need to be paid to how the learning alliance will relate to and feed into other learning platforms.

In the start-up phase of an alliance, a rapid city scoping can be used to identify the stakeholders who agree to come to the table and to start initial discussions. Elements of this analysis will be strongly participatory as they involve workshop exercises with stakeholders and this is therefore a key process step in establishing the learning alliance. The process of stakeholder analysis can continue into the first or second learning alliance meeting if necessary. Ultimately this analysis will probably involve 10-20 days' work for the coordinator, or for a specialist supporting the facilitator, over a period of about 2 months. This will involve literature review, interviews, discussions with stakeholders (bi-lateral meetings, focus group discussions, and discussions involving existing platforms or networks) workshops, documentation and analysis.

The primary purposes of stakeholder analysis are to ensure that as many of the key stakeholders as possible are included in the alliance (all those who will agree to take part), that stakeholders come to know and understand each other better, and that multiple viewpoints are captured. The document that emerges from this process can be used as a baseline study for the state of relationships and activities before the intervention, and can be used as a reference throughout the project to check on progress and to assess how much change has occurred. During the project, it may help in reviewing the strategy for stakeholder engagement. There are a range of methods and tools for doing stakeholder analysis. In this chapter we present key questions used in the SWITCH project, followed by lessons learned. A detailed explanation of the steps and methods proposed in SWITCH are then presented.

## Stakeholder analysis: key questions

Stakeholder analysis takes place within the context of a programme or project or initiative that has an aim and a longer term objective. These will determine the scope of the stakeholder analysis. Most learning alliances are set up with a broad vision to achieve radical change – in the case of SWITCH across all elements of the urban water cycle. Most learning alliances will therefore require a broad stakeholder analysis. Stakeholder analysis should be initiated as part of the scoping process for starting the learning alliance.

Six questions should be addressed:

1. Who are the main stakeholders and what roles do they play?
2. What are the main problems for each stakeholder (in relation to the issue being considered)?
3. What are the key factors that influence the activities of each stakeholder in their functions?
4. Who are seen as the prime movers amongst the stakeholders?
5. What are their relationships with each other? Are there any conflicts?
6. Who is being left out? How can they be included?

Stakeholder analysis is not just about identifying who should be in a learning alliance. It also helps to understand the different perspectives, roles and interests of stakeholders in the area of interest. Some of these may be obvious (the main water service provider for example) but some may be little known or understood before this exercise.

At the beginning of this process it may be useful to organise the sub-groups of stakeholders identified through question 1 into separate meetings or workshops where they may find it easier to express their views freely. In particular those who are often excluded from decision making processes (minority groups and in some cultures, women) may prefer to meet separately at the beginning of the process. However, the long term aim of the learning alliance is to bring all relevant stakeholders together, either physically through alliance meetings, or at least bring their inputs into such learning alliance meetings and processes through a representative.

## Lessons from doing stakeholder analysis in SWITCH

Stakeholder analysis is an important tool with which one can design whom to involve in which steps of the alliance process. Upon reflection it did not receive adequate resources and priority in SWITCH. Challenges encountered relate to the time and specific skills that are required, support needed and the value it was given in the project design.

While the city alliance teams did succeed in producing a stakeholder analysis, it was often a lengthy process that was not completed until the project was well underway. In most cities, it involved the learning alliance facilitator and coordinator, supported by an external person with social science research skills. Training was provided by the international support group on learning alliances (headed by IRC), and a briefing note outlined the method and reporting requirements. However, in practice stakeholder analysis proved to be challenging.

The challenges encountered related to the skills required (social science research and analysis skills, writing skills and sensitivity to the local context); the time required (accessing stakeholders, doing interviews, brainstorming, analysing and documenting the findings and feeding them back to the stakeholders all take time); and the priority given to this process (stakeholder analysis was not a key milestone required at the start-up phase of the project and other deliverables were given priority).

Even despite these challenges, the process of doing stakeholder analysis was appreciated, because it did help the SWITCH city teams and alliance members to better understand the roles and relations of the key stakeholders and in some cases it provided the first opportunity to engage with specific stakeholders, serving as an entry point for building a relationship.

## Answering the key questions, steps and tools

The six questions mentioned above should be explored together with stakeholders during the scoping meetings and initial workshops. For each of these questions, one or more participatory tools will be described in the following sections. More tools and resources for stakeholder analysis are suggested at the end of this chapter.

It may appear to some stakeholders, particularly those who are influential in the sector and who know it well, that the exercises below are a bit abstract or even unnecessary. However, what these questions and exercises are designed to address is how the sector works from a number of different perspectives. If done thoroughly the exercises will produce some new insights, or points of debate, for all stakeholders.

### Question 1: Who are the main stakeholders and what roles do they play?

The scoping exercise and the subsequent discussions are aimed at identifying the people, organisations and institutions affected by or with an interest in the issues at stake. Criteria for selecting stakeholders could be the following: “benefit from the project”, “critical role in ensuring success”, “legally required to participate”, “has specific knowledge on processes”.

Regardless of the criteria chosen, the following issues should be considered:

- Do they contribute to (or block) decision making?
- Are they needed for implementation (e.g. of project activities)?
- Are they affected by failures in the area of interest (e.g. water consumers, river users and people living in the flood plain are all potentially affected by failures of urban water management)?
- Do their activities pose problems for others (e.g. small companies that may discharge pollution into rivers)?

To some extent, it may be decided to categorise stakeholders according to which of the above questions best identifies their interests. However, distinctions may not be clear-cut. Coordinators and their teams should be wary of stereotyping or stigmatising particular stakeholders or groups. For example, polluters may initially be seen as “problems”, but in practice be ready to seek solutions to pollution. Powerful decision makers and large water service providers may be seen as arrogant or inflexible but turn out to be eager for greater involvement and discussion with other stakeholders. The learning alliance is – at its best – a unifying body rather than an organisation of divided interests. However, different stakeholders do have different perspectives and interests, and conflict may be a necessary or even important part of the process of moving forward. Better to acknowledge and resolve conflict than to pretend that it does not exist.

### Method: Scoping exercise followed by workshop and interviews

The initial scoping exercise will produce a list of potential stakeholders and their likely interest in the learning alliance. Information can be gathered through a form similar to the one shown in Figure 3.2.1. Further information can be collected through desk study, discussion during an inception workshop, or one-to-one interviews with stakeholders.

The team should then identify clusters of stakeholders who can be brought together in a stakeholder analysis workshop. It is very likely that new stakeholders will be identified during the round of one-to-one interviews. These stakeholders need to be added to the list and be included in further discussions.

Figure 3.2.1 Stakeholder Scoping Exercise (example from SWITCH Accra)

Stakeholder	Stakeholder group	Role of stakeholder	Stake (interest) in the project	Category of stakeholder <sup>1</sup>
IMWI	Research institute	Innovative research in water management for agriculture. Regional resource centre for urban and peri-urban agriculture.	Several ongoing projects and initiatives in agriculture water and cities as well as multi-stakeholder processes in project. Opportunity to capitalise on several years of research and partnership in Ghana.	'Key stakeholder' in area of urban agriculture.
Etc.				
Etc.				

### Question 2: What are the main problems for each of the stakeholders in relation to the area of interest?

As explained in Guideline 3.1, stakeholders are likely to be motivated to join a learning alliance because they see an advantage for improving the way they work, spreading innovation or overcoming obstacles. They often have a specific view about the problems they most want to address. Different stakeholders are likely to have very different perceptions of the problems, and there may be some stakeholders who see only opportunities rather than problems. They may even possibly feel that things are fine as they are. In that case their motivation in joining the alliance may simply be to ensure that no unwelcome changes are foisted on them! To answer this and some of the subsequent questions, it is necessary to bring clusters of stakeholders or representatives together in short workshops. These workshops need to be facilitated by experienced facilitators to ensure that in particular vulnerable and disadvantaged stakeholders or their representatives are able to participate in a meaningful manner.

#### Method: 'Problem tree' exercise to identify stakeholder perceptions and underlying causes

Problem trees are a common tool used in the 'logical framework' approach to planning and planning cycle-based approaches. Despite the name, the aim of using problem trees is to help stakeholders move beyond the statement of their 'problems', which are, typically,

actually symptoms or effects. The problem tree is used to identify the fundamental causes of problems and the most important effects that they generate. The main output of a problem tree exercise is therefore a diagram which creates a logical hierarchy of causes and effects and the links between them.

Creating an effective problem tree calls for the support of a skilled facilitator, and enough time for discussion. In the case of SWITCH the tree was used to start the process of achieving a common analysis and a shared understanding of water-related issues. In such a process, it is crucial that there is representation of a wide range of stakeholders as there may be considerable difference of opinion between different (groups of) stakeholders. Problem trees can be revisited at different points in the planning cycle to check that the common understanding still applies. It is possible that with time and experience a deeper understanding of the issues will alter the perspective of causes and effects. Box 3.2.2 below presents some tips and trips on problem tree analysis.

#### Materials needed:

- markers
- scotch tape, pins, or spray glue for sticking cards to the sheet
- cards
- string
- a large sheet to place on which to place the cards
- flip chart paper on which to copy the problem tree once it has been agreed.

#### Method for Problem Tree session:

1. In one or several groups (ideally 6-12 people), brainstorm all water-related problems in the domain and put each one on a separate card (one issue/problem per card).
2. From the cards, in group discussion, identify one or more shared core problems. These are the major problems that are common to several stakeholders and generally agreed to be serious and the most important to overcome. Write precise definitions of these – again, one definition to each card.
3. In group(s) categorise all the other cards into causes or effects of the core problems; and stick them below (causes) and above (effects) the core problem on a large sheet.
4. Use string to link each card to all those cards that are a direct cause, and to all the cards that it affects in turn. There can be multiple causes for each effect and multiple effects for each cause. Some cards (such as poverty) may be both fundamental causes AND principal effects – in this case, use two cards and place them above and below.
5. For each card, examine the other cards that may cause it and ask the question 'are these cards sufficient to explain why this occurs?'. If the answer is no, then write new cards until all causes are identified.
6. Create horizontal groups of cards that cause, or are the effects of another card. Where cards are very similar agree on a common wording and create a single new card to represent them all.
7. Review the logic, and alter the links until everyone in the group is satisfied with the result.
8. Either photograph the final problem tree, or copy it carefully onto a sheet of flip-chart paper.
9. Share a copy of the problem tree with stakeholders.

<sup>1</sup>Different categories can be agreed. One definition could be a) *Key Stakeholders* (with significant influence in the area of interest);

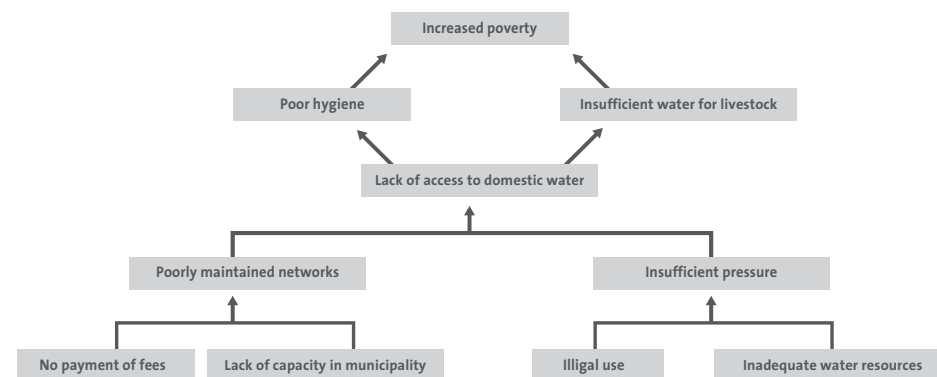
b) *Primary Stakeholders* (intended beneficiaries of the project); c) *Secondary Stakeholders* (act as intermediates of the project).

**Box 3.2.2 Problem tree tips and tricks**

- Take the time to make sure that there is clear agreement as to the meaning of each card, and its relations with others. Make sure this meaning is documented for example by writing on the back of the card.
- If possible put problems of similar relative importance on one horizontal row.
- A good problem tree workshop requires skilled facilitation. Facilitators should be familiar with the problem tree approach, and also with the area of interest, so that they can support stakeholders in making links between cause and effects.

The problem tree exercise is as important for its role in generating dialogue and shared understanding between stakeholders as it is in creating a written output. Sufficient time must be given to allow for discussions and arguments to be resolved.

Figure 3.2.2 Example of problem tree



### Question 3: What are the key factors that influence the activities of each stakeholder in their functions?

The previous question related to problems. Question 3 looks at how the stakeholders function. What motivates them to act as they do. What internal and external factors affect how they change the way they work? Answering this question helps to get a better understanding of each stakeholder's view of their immediate workplace environment and the wider enabling environment in which they operate.

### Method: Workshop discussion

A workshop can be set up as a kind of focus group, made up of one category of stakeholder who fulfil more or less the same function, or it may be made up of stakeholders with different roles and backgrounds. This will depend on the level of trust and confidence that stakeholders have in each other, the purpose of the workshop and to some extent on the quality of facilitation.

The group or groups explore factors that play an important role in the activities of each specific stakeholder. For example in considering issues around wastewater, the factors could include government policies, regulations, media attention to levels of pollution, seasonal climate changes, use of latrines, levels of maintenance in treatment plants *etc.*

Once the factors have been listed and agreed the group discusses further questions:

- What external and internal factors that are identified in the enabling environment are seen as the most important for the stakeholders present in the workshop?
- Which external actors put direct pressure – either positive or negative – on the stakeholders by aggravating or mitigating problems?
- Are there stakeholders who can influence such factors, positively or negatively?

Throughout this discussion, look for ways to make the results of the discussion visible – e.g. by making drawings that show the relationships being discussed. Ensure that all participants take part in the discussions. The facilitator must use their skills to draw out those who might feel reluctant to speak or are not heard.

### Question 4: Who are seen as the 'prime movers' amongst the stakeholders?

Different actors influence interactions within the system in different ways. For example, policymakers design and implement policies and regulations, regulators are strict or relaxed, market actors influence prices, donors finance programmes, research units offer certain technological solutions, consumers prefer certain types of toilet, industry discharges waste in a particular way, while environmental groups campaign and exert pressure. Each actor has their own influence on the social interactions within a system. However, some may exert more influence than others, and coalitions may appear around these 'prime movers'. They may exert strong leadership on the way the knowledge system functions, and hence on the type of outputs and impact the system achieves.

This question is aimed to identify, based on stakeholders' perceptions, the 'prime movers' or 'champions' who have most influence on what happens within the system. It will describe the influence and/or leadership of each of these key individuals (or groups) as seen by different subgroups.

### Method: Workshop discussion using 'spider diagram':

In a workshop with a cluster of stakeholders identify who are seen as the prime movers amongst stakeholders and discuss what is seen to be their influence. Is this influence beneficial or harmful to the issue under discussion? Should their leadership be encouraged, modified or challenged?

Expected outputs:

- A description of those who are seen by the workshop participants as 'prime movers' – those with leadership over others and influence on what happens within the system. This needs to be done around each of the core problems that have been identified in a city (see problem tree exercise).
- A picture, in the form of several spider diagrams (see Figure 2.1), of the influence and/or leadership of each of the prime movers as seen by different subgroups/actors.
- Analysis of the benefits and problems that flow from this situation.

Relevant questions:

1. Who do different stakeholders see as the prime movers relating to the area of interest?
2. Which of these prime movers exert the strongest influence?

A spider diagram is a good tool for discussing and coming to understand the perceptions of the participants of the workshop. A spider diagram helps to give a coherent and visual picture of the system.

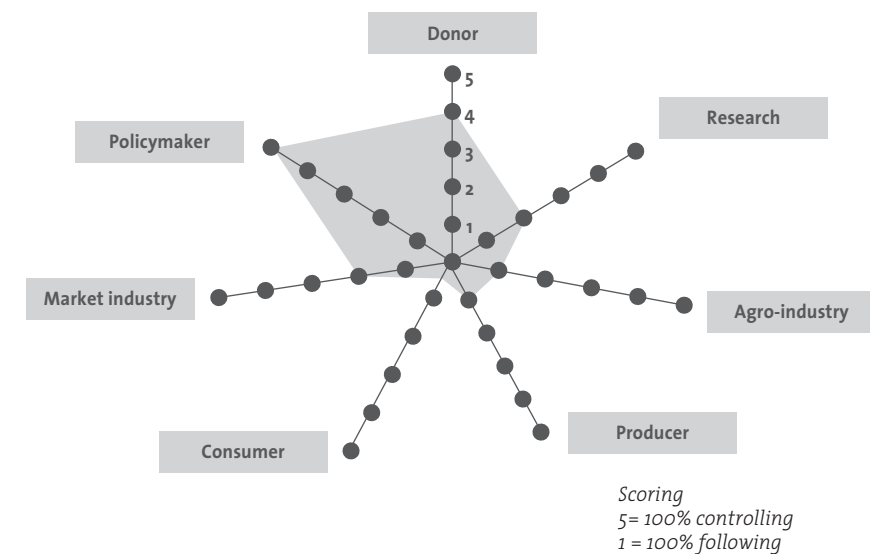
Materials needed:

- flip chart
- markers
- stickers.

Method for Spider Diagram session:

- List the main issues or areas of interest that have been identified during the scoping visit. Make a separate spider diagram for each issue. There should be several copies of the (blank) spider diagram as in this exercise it is useful to work first in pairs or small groups and then compare results and discuss in plenary at the end.
- Workshop participants should write the key groups of stakeholders in a circle on a piece of flip chart paper, leaving space inside the circle to draw the spider diagram (Figure 3.2.3). Draw a line from the centre of the circle to each group of stakeholders and mark off ten spaces at regular intervals on each line (there will be a separate line for each stakeholder). Number the marks from the centre with 1 nearest the middle and 10 at the outside.
- Ask each participant (or group) to say how strong an influence each different type of stakeholder exerts on the area of interest (such as IUWM). For each stakeholder, the participant then places a sticker on the line to indicate the strength of influence. Those with a weak influence are marked with a low number, and those with a high, more 'controlling' influence are given a high number, further away from the centre. When all the stickers have been placed then the web can be drawn by linking up where the stickers have been placed.
- Since more than one person, pair or group has been conducting this exercise the individual webs will probably differ. The facilitator should pin up the webs where everyone can see them and lead a discussion about whether the whole group can agree on one web. Allow time for debate where there is disagreement on the strength of influence of a stakeholder try to come to a consensus. If there is no consensus, acknowledge this in the workshop and in the notes from the workshop.

Figure 3.2.3 Example of a spider diagram from SWITCH Accra, showing level of influence of stakeholders in Accra



### Question 5: What are stakeholders' relationships with each other? Are there any conflicts?

Stakeholders may have relationships which are formal or informal. One may be a client of another, or their regulator or their customer. In the longer term, working together in a learning alliance should improve understanding between stakeholders of each other's problems and perspectives. However, there may also some conflict, open or suppressed, and it is important to learn about these or to see them coming. Understanding the relationships between stakeholders is important for the problem analysis, planning and implementation of project activities, and for mutual learning.

At the beginning of the process you can use the tools presented below to do an assessment of relationships. A better understanding of tensions and the potential for stronger partnerships will emerge through working with the stakeholders over time. Answering this question consists of two steps which should be done together with stakeholders: 1) identify different relationships between different stakeholders and make a diagram representing the most important stakeholders and their relationships 2) further explore the relationships through focus group discussions.

It is important to realise that relationships between stakeholders might be strained in some instances. Hence, the facilitator needs to be careful when discussing this subject and avoid further acceleration of problems. Making conflicts explicit can make them worse, or it may help stakeholders to address and resolve them.

### Method: Assessing relationships using a relationship diagram and a focus group discussion

#### Step 1: Relationship diagram

##### Method:

- Ask participants to draw a diagram showing the relationships between stakeholders identified in the previous workshop or exercise. Each (group of) stakeholders is represented by a circle, and the size of the circle indicates the perceived importance of that stakeholder. In this context 'importance' may mean something similar to being a 'prime mover' as described above, or it may be an indication of size. Let the participants decide on their measure of importance.
- Draw the relationships between the stakeholders by linking the circles with a line and indicate the importance of the relations by varying the thickness of the lines.
- In a focus group discussion, describe the type of relationships.

#### Step 2: Focus Group Discussion

##### Relevant Questions:

1. What patterns of relationships can be seen among the actors, and especially the prime movers, in the system? Indicate whether a relationship can be described as (1) control (2) mutual collaboration (3) mutual dependency (4) exchange of information (5) producer – client (5) employer – employee.
2. Which kind of relationships are seen as most important? Why are these important?
3. What sorts of coordination occur now?
4. What gaps and overlaps can be seen with respect to responsibilities and coordination?
5. Are there conflicts?

List the important relationships on a piece of paper. For each of the main relationships the following questions also need to be answered:

1. Is there a history of collaboration?
2. Are there any hierarchical relations between different stakeholders?
3. Is there any negative stereotyping?
4. What are your experiences with the different stakeholders?

### Question 6: Who has been left out? How can they be included?

This is a question designed to double check that all significant stakeholders have been identified and included. It is best to do this in groups and then compare results. Stakeholders are generally invited because of their function, but will a learning alliance made up of professionals all with similar backgrounds be able to identify problems which may only affect marginalised sections of the population? Are there any steps in the urban water cycle that have not been addressed? Are there important user groups who ought to be included? Does the list of people to be invited to the learning alliance look very uniform? Are women and men represented? Are there significant ethnic minorities who are not represented? Is it desirable to include some community groups?

If some excluded groups are identified and it is agreed they should be included, then thought should be given as to how this will be done. Will people feel comfortable in the learning alliance setting? Are any separate meetings necessary? Should some meetings be held in a community setting at a time of day more convenient for the target group? Social inclusion is one of the aims of the learning alliance approach and this is an opportunity to reflect on how to achieve it.

## Documenting the stakeholder analysis

It is important to make notes of discussions that are held during workshops and keep records of outputs, such as diagrams. Notes can be used for making reports to those who attended the workshops, while summary reports can be useful for attracting potential new stakeholders to the learning alliance. They should be regarded as learning tools for the project team and for the learning alliance, which can use them to see where they started and assess how the project has moved forward or indeed changed direction.

The main part of the stakeholder analysis report should be kept concise. This can be presented as a summary with further detail in annexes. Some parts of the report may be for internal (project) use, much of it may be for internal learning alliance use, but parts of it may be for external distribution. The coordinator and facilitator should consider which parts should be confidential and which should be public, bearing in mind the need for sensitivity over potential tensions or conflicts between different stakeholders.

### Reporting format for stakeholder analysis

It is suggested that the total report might be about 20 pages excluding the annexes.

You will have to consider carefully which parts are for use by the project team, learning alliance, or for external distribution. This report should be a working tool for the project and (parts of it at least) for the learning alliance.

Present a short summary of your findings, including those that are most noteworthy. In the main part of the report describe the stakeholders, roles and problems, including the different types of stakeholders. It is important that your report includes your analysis, not just the factual or formal information. For example, which stakeholders are influenced by which factors? Who are the most influential prime movers? Describe the relationships between stakeholders. Include a final section on conclusions and recommendations for the future. Which stakeholders are of vital importance for the learning alliance? What is the best strategy to attract key stakeholders? How can you keep stakeholders with different perspectives and influences on board?

It is useful to include some of the materials (e.g. problem trees, diagrams, photos) developed in the workshops, either in the main part of the report or as an appendix as they provide a visual reference.

## Summary

Stakeholder analysis is aimed at identifying and understanding stakeholders, their roles, interests, relationships and perceptions of problems. It is wise to clarify the main purpose of the stakeholder analysis from the start and agree on the criteria for assessing the stakeholders. Then list which criteria you will use to prioritise whom to involve. A participatory approach (in contrast to a purely academic analysis) enhances the forming of clusters of stakeholders who have a better understanding of each other and are willing to collaborate on certain issues. Discussions and visual outputs from the stakeholder analysis process should be recorded and shared within the project team and also with a wider group of stakeholders. A full analysis report, specific diagrams or summary documents should be considered as useful outputs for different audiences.

### Related websites and further reading

The methodology developed described is based on the RAAKS (Rapid Appraisal of Agricultural Knowledge Systems) framework: a participatory methodology for analysing complex multi-stakeholder situations and for designing effective co-operation and communication strategies. RAAKS was developed by the University of Wageningen (The Netherlands): <http://portals.wi.wur.nl/msp/>

There are many online resources on stakeholder analysis. Wikipedia offers an example of different methods and tools that can be used for stakeholder analysis: [http://en.wikipedia.org/wiki/Stakeholder\\_analysis](http://en.wikipedia.org/wiki/Stakeholder_analysis) [Accessed January 2011].

Grimble, R. & Chan, M.K., 1995. Stakeholder analysis for natural resource management in developing countries. *Natural Resources Forum*, 19 (2), pp. 113-124.

EMPOWERS: Laban, P., Barghout, M., Moriarty, P. & Sarsour, S., 2005. *Stakeholder dialogue and concerted action for integrated water resource management* (Working Paper No. 6). Amman, Jordan: EMPOWERS. [Online] Available at: <http://www.empowers.info/page/1092> [Accessed 21 January 2011].

The International Centre for development oriented Research in Agriculture (ICRA): <http://www.icra-edu.org> The International Centre for development oriented Research in Agriculture (ICRA) has several useful learning resources, for example the document called ICRA Learning Materials – Stakeholders – Approaches or the ARD Resource Book for South Africa, by Richard Hawkins (main editor): <http://www.icra-edu.org/page.cfm?pageid=publicenglishjointpublications> [Accessed January 2011].

Nash, R., Hudson, A., & Luttrell, C., 2006. Mapping political context – A toolkit for civil society organisations. [Online] London: Overseas Development Institute, available at: [http://www.odi.org.uk/RAPID/Publications/Documents/Political\\_Context\\_Toolkit\\_web.pdf](http://www.odi.org.uk/RAPID/Publications/Documents/Political_Context_Toolkit_web.pdf) [Accessed January 2011].

Chevalier, J.M. & Buckle, D. J., 2008. *Social Analysis System (SAS): A guide to collaborative inquiry and social engagement*. Sage: New Delhi, California, London, Singapore and International Development Research Centre: Ottawa. [Online] Available at: <http://www.sas-pm.com/> [Accessed 21 January 2011]. Useful chapters include Stakeholder Identification.

The Multi-Stakeholder Processes and Social Learning portal of Wageningen University contains useful resources on stakeholder analysis and other elements relating to stakeholder engagement and joint learning: <http://portals.wi.wur.nl/msp/?page=1287> [Accessed 21 January 2011].

Wastewater Agriculture Sanitation and Poverty Alleviation (WASPA- Asia project) [Online] Available at: <http://www.iwmi.cgiar.org/waspa/WASPAprojinfo.htm> [Accessed 21 April 2011].

Ridder, D., Mostert, E. & Wolters, H.A. eds., 2005. *Learning together to manage together: improving participation in water management*. HarmoniCOP (Harmonising Collaborative Planning) University of Osnabruck, Institute of Environmental Systems Research: Osnabruck, Germany. [Online] Available at: <http://www.harmonicop.uos.de/HarmoniCOPHandbook.pdf> [Accessed 21 January 2011].



# 3.3

SWITCH graffiti by students on the walls of the Anne Frank School, Belo Horizonte, Brazil.  
(Photo credit: John Butterworth)

## Developing a joint vision

Charles Batchelor and John Butterworth

*Visioning, or formulating a shared description of a desired future state, has the potential to build a shared sense of direction. It can also create targets and benchmarks and galvanise commitment to strategies and plans. A vision is a concise description of a desired medium- to long term future state. This chapter describes why and how visions are developed. Examples are provided from SWITCH where city visions were developed by the learning alliances and linked to broader visions for city development.*

### Key concepts

<i>Vision</i>	A concise description of a desired future state.
<i>Visioning</i>	The process of developing a vision.
<i>Backcasting</i>	Forecasting predicts a future based on current trends; backcasting works the other way around. It begins with a vision of a desirable future and seeks to identify policies and programmes to get there from the present situation.

### Introduction

Lewis Carroll is quoted as saying: “If you don’t know where you are going, any road will get you there”. This insightful statement can also apply to urban water management. The development and objective assessment of various urban water management strategies or plans is not possible unless decision makers agree on clear a vision – a concise description of a desired future- of what they would like to achieve.

Visioning is often used to promote stakeholder dialogue during the early stages of forming a learning alliance. This is because visioning provides stakeholders with an opportunity to exchange views and debate opinions and aspirations. If it is facilitated well, visioning can be empowering, inclusive, participatory and fun.

Visioning helps stakeholders to think beyond the day-to-day reality of problem solving, and to imagine an achievable medium to long-term future for which they can plan – typically 5-15 years ahead at community level or 10-30 years ahead at city level. To be useful as part of a wider planning process, a vision must be realistic and achievable and grounded in the realities of the sector, including water resources, demand, current trends, successes and, where appropriate, ongoing water management initiatives.

Visions invariably have a political element. Some favour greater equality; some prioritise environmental protection; others may want the market to work more efficiently. As a consequence, facilitation is needed to reconcile often very different views on the relative importance of environmental sustainability, economic growth and provision of water services to poorer social groups in a vision. Despite this, it is often easier to get consensus amongst a diverse group of stakeholders on the components of a vision than on the strategies and plans for achieving the vision. Strategies and plans are often more specific and therefore more politically contentious than visions.

Visioning gives stakeholders an opportunity to discuss their hopes, concerns and fears with other members of a learning alliance. In this context, visioning can create a focus for discussion between specialists (for example researchers) and practitioners (for example wastewater farmers). Facilitation is often needed to ensure that specialists present information in a form that can be understood by practitioners. It is also important that specialists recognise that their role in visioning should be one of supporting discussions rather than leading them.

In most circumstances, visioning should be part of a wider planning process, rather than a one-off activity. Visioning is often necessary at a number of different levels from the community to national level. However, visions elaborated at every level should ideally inform, and be informed by national policies and strategies. Consistency is also important across visions created at different spatial and temporal scales. A city level vision should be consistent with a vision that is developed for the district or governorate where the city is located; a vision developed for the next 10 years should be mutually consistent with a vision created for a time horizon of 30 years.

#### Box 3.3.1 Accra vision 2030

- Everyone in the the Greater Accra Metropolitan Area of Accra, regardless of economic and social status, will have access to uninterrupted water supply, at an affordable price within a reasonable distance from the house. The water quality of the supplied water will meet Ghana Standard Board criteria. Non revenue water in the GWCL system, caused by physical and commercial losses, will have decreased to 25 percent.
- At least 80 percent of Accra's citizens have access to an acceptable level of sanitation facilities, including flush toilets, KVIPs or good public toilets. Pan and bucket latrines will be phased out. Good sanitation behaviours will be practiced by at least 80 percent of Accra's citizens. There will be no more open defecation and littering, and hand-washing after toilet use will be common practice. People will willingly pay for waste management. This will have led to a 70 percent reduction in water and sanitation diseases.
- Accra will be a cleaner city with a well-functioning drainage system. There will be integrated solid waste management (collection, transport, treatment and final disposal) of solid waste in a sustainable way. At least 90 percent of the solid waste will be collected. The improved collection of solid waste will have eradicated the dumping of solid waste into small and larger drains. The drains will be free from solid waste, and pollution of the surface waters and the risk of flooding will have reduced. There will be improved productive uses of water for livelihood (micro enterprises and agriculture), especially through the reuse of stormwater and/or wastewater in urban agriculture.

## Getting started

**Facilitation** – In most cases, visioning requires facilitation that includes setting up and running stakeholder meetings and workshops, documenting the outcomes of these events and circulating materials to participants. Ideally, facilitators will have a good knowledge of the sector as well as training and experience in the use of facilitation techniques.

**Specialist support** – Specialist support is often needed to prepare materials for meetings and workshops. These materials can include reviews and copies of existing visions and analysis of trends that might need to be considered during the visioning process (e.g. increase in water demand over time by different user groups, changes in the quality of important sources of supply, data on access to safe sanitation, wastewater flows *etc.*). Specialist support may be necessary during some or all workshops to ensure that visions are realistic and achievable.

**Credible support** – To have credibility and legitimacy, the group of stakeholders, whether in a learning alliance or other stakeholder platform should, wherever possible, include or have the support of democratically-elected representatives.

**Marginalised groups** – The group of stakeholders should be gender aware and proactive in involving or representing marginalised social groups in a meaningful way.

## Methodology

### Steps to develop a shared vision

**Step 1: Form a learning alliance, or other platform, if it does not already exist.** The purpose or focus of the stakeholder platform should be clear.

**Step 2: Agree on the scope of the vision.** One of the first tasks of the learning alliance or stakeholder platform is to reach agreement on the area of interest and the timeframe for which a vision is to be developed. In most cases, the area of interest will be delineated by an institutional boundary (e.g. the area under the responsibility of metropolitan authorities). The time frame will often be the same as the one(s) used by the city or in national water management plans.

**Step 3: Review existing visions.** It is good practice to obtain copies of existing visions for the areas of interest that relate to the water and other sectors, including visions relating to the area of interest but perhaps at a larger scale or in a neighbouring area. These visions should be reviewed and summaries made available to members of the learning alliance or stakeholder platform.

**Step 4: Identify main issues.** Identify the main issues that are to be included in the vision. Some of these will be directly-related to the water sector (e.g. increasing water demand, climate change) others may be indirectly linked (e.g. economic growth, energy costs). These issues can be identified, grouped and prioritised using a combination of techniques that include: problem tree analysis, brainstorming using cards and/or a check list provided by the facilitators. (See Chapter 2 for a description of how to devise a problem tree.) Existing visions can also be helpful to discussions.

**Step 5: Develop an outline vision for the area of interest over the agreed timeframe.** The vision is best described using a concise mixture of descriptive narrative and numerical targets. Techniques such as trend analysis, backcasting (see key concepts) and forecasting can help to ensure that the vision is not a “wish list”. Stakeholders can be asked to ensure that their vision is SMART (Specific, Measurable, Achievable, Realistic, Timebound). Specific indicators strengthen a vision, and later make it easier to monitor progress towards its achievement.

**Step 6: Check for mutual consistency with other visions.** Check that the draft vision is consistent with visions at higher or lower spatial or administrative scales. Similarly, check that the draft vision is broadly consistent with government policy. If it isn't consistent on both counts, it may be necessary to make modifications so as to secure political support and increase the probability of funding for strategies and plans aimed at achieving the vision. To some extent a learning alliance may seek to build support for policy changes, but if the vision is completely opposed to the governmental vision for the future it may be difficult to win support from a broad range within the sector or area of interest.

**Step 7: Assess the probability of achieving the vision.** If relevant, use the vision to help design a water resource assessment and use it as a basis for scenario building and strategy development. The aim is to assess the viability of different strategies and the risks and uncertainties relating to achieving the vision under different scenarios. If this analysis shows that there is a low probability of achieving the vision under some or all of the scenarios, then the vision probably should be modified.

**Step 8: Wider consultation.** Disseminate the vision widely within the area of interest and to interested parties at higher levels (e.g. national government officers, academics, relevant national NGOs). Elicit comments and feedback. Finalise the vision by taking account of constructive comments.

#### Box 3.3.2 Tips and tricks on developing a vision

- Allow plenty of time for discussion in plenary sessions and breakout groups during visioning workshops. There are benefits in developing and adapting a vision over a series of meetings, as this gives time to revise initial ideas and to reach a consensus.
- Facilitating a visioning process is relatively straightforward, but it is still best to have facilitators with experience and/or those who have tried developing visions themselves. Whilst visioning can encourage stakeholder dialogue and participation, it can also prompt conflict and resistance to change. Trained facilitators can spot the signs and react accordingly, perhaps by giving time for participants to think about ways of including different perspectives.
- ‘Scene-setting’ expert presentations can be useful in prompting and guiding discussion, and the involvement of specialists is crucial to the validity and robustness of the resulting vision. However, it is best not to include a lot of scientific presentations in a visioning workshop and specialists should not be allowed to dominate meetings because ownership of the vision by the whole learning alliance or stakeholder platform is also very important.

**Alexandria vision 2037**

'A proud water city where available water resources are managed in an integrated manner, with the participation of all citizens, and are used effectively for development within a framework of environmental sustainability. All citizens have access to high quality (meeting national norms), reliable, sustainable, and affordable water and sanitation services and benefit from a clean and healthy environment'.

*Source: Alexandria Learning Alliance, July 2007*

**Making sure the vision is clear, useful and used**

Visions describe a desired future state and, as such, should not include a description of the strategies that will be used to achieve this. That will come later (strategy development is discussed in chapter 3.7).

However, including numerical information (for example specific targets for coverage or reductions in pollutants) increases the value if they can be used to evaluate whether strategies can achieve all or part of the vision. Quantitative information is also helpful if visions are to be used as part of a monitoring programme aimed at assessing progress.

Visions should be written in a lively and interesting style as this increases their value for advocacy or awareness campaigns. Writing a clear and concise vision requires practice and it is often helpful to have access to copies of existing well-written visions, although care should be taken not to be over-influenced by the content.

**Box 3.3.3 Lessons from SWITCH city alliances**

- In Birmingham the formulation of a vision for the city encouraged the participation of all alliance members and helped to keep their interest. The focus on sustainability helped to stimulate members to think beyond their daily roles and mandates and the visioning exercise helped get the message across that SWITCH research and research demonstrations are about taking a long-term view on water management.
- In Lodz the process of vision and strategy development around water was linked to broader discussions about city development, water and environment. Creating a nicely designed poster with the vision clearly laid out will allowed the vision to be circulated widely and displayed in workplaces of stakeholders.

## Summary

In summary, visioning helps to:

- Set a sense of direction and provide a target or benchmark against which the success or failure of strategies and plans can be monitored
- Encourage constructive discussion and understanding amongst a diverse group of stakeholders
- Promote the active involvement of stakeholders in developing and implementing water management strategies and plans
- Encourage stakeholders to look forward rather than remain bogged down in current problems
- Create a statement of intent that can attract the attention and enthusiastic support of the media and the general public.

Visioning can also be empowering, inclusive, participatory and fun. Visions developed with a learning alliance should be linked to wider planning processes and be consistent with existing visions beyond the topic of interest that the alliance will focus on.

A vision is very useful both in drawing attention to the work of the learning alliance and for monitoring the direction of future work. It is a powerful advocacy tool and it can be used in strategic planning.

**Related websites and further reading**

The Euro-Med Participatory Water Resources Scenarios (EMPOWERS) project. EMPOWERS was a multi-country (Egypt, Jordan, West Bank/Gaza) research and development project (2003-2007) project adapted visioning and scenario-based planning methods to participatory planning of water projects in the Middle East. The guidelines describe how visioning can fit into a wider planning process. They also contain details on how to use time series analysis. See The EMPOWERS Approach to Water Governance, Guidelines, Methods and Tools; Chapter 4, The Management Cycle, Phase 1: Visioning. [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120) [Accessed 21 April 2011].

The Malta Water Resources Review provides an example of how a vision can be used to evaluate the utility of different water management strategies. [www.fao.org/docrep/009/a0994e/a0994e00.htm](http://www.fao.org/docrep/009/a0994e/a0994e00.htm) [Accessed 21 April 2011]. Wikipedia contains information related to visioning and strategic planning forecasting, backcasting, trend analysis and other techniques that can be useful when developing and evaluating a vision. [en.wikipedia.org](http://en.wikipedia.org) [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120) [Accessed 21 April 2011].

*A learning alliance can be compared to a network that brings together a range of potentially conflicting interests. Communication is central to the process and to getting positive results. Communication in a learning alliance typically involves a range of knowledge sharing activities, from workshops with alliance members, to bilateral meetings, working groups, field visits, e-discussions and social events. It also involves reaching out to stakeholders outside the alliance through events and information products and services. Information management is about collecting and processing information so that it can be easily accessed and used. Given the diversity of stakeholders involved, the language and channels used need to be adapted to fit stakeholders' needs and the nature of the interaction. Learning alliance facilitators need both technical and social skills for managing information sharing and for creating space for constructive dialogue between alliance members. This guideline outlines the issues that need to be considered.*

## Key concepts

### *Social entropy*

A measure of the natural decay within a social system. It can refer to the decomposition of social structure or of the disappearance of social distinctions. See: Wikipedia, [http://en.wikipedia.org/wiki/Social\\_entropy](http://en.wikipedia.org/wiki/Social_entropy)

### *'Wicked' problems*

'Wicked' problems is a term coined by Rittel and Webber in 1973 to describe problems that are ill-defined, ambiguous: "the wickedness of the problem reflects the diversity among the stakeholders in the problem". There is often little consensus about what the problem is, let alone how to resolve it. These problems cannot be successfully treated with traditional linear, analytical approaches, because they are part of complex, interacting issues.

### *Traducture*

A range of 'translations' to explore, as well as the science, art, technology and craft of making them. Traducture is based on conceptual frameworks of translation, which offer a variety of avenues for engaging different standpoints, including perspectives which seek to unravel dominant discourses, particularly where they distort reality through misrepresentation, such as stereotyping or exclusion. This enables the possibility of bringing knowledge, experienced in diverse locations, to bear.

# Facilitating communication in learning alliances

Carmen da Silva Wells and Ewen Le Borgne<sup>1</sup>

1. The authors would like to acknowledge inputs from Jaap Pels and Peter Bury from IRC International Water and Sanitation Centre on communication in networks: personal communication and SWITCH Learning Alliance Briefing Note 5 Adapted from wa Goro by Cumming, S., 2011. Define: traducture. (The Giraffe blog). [Online] (Updated 3 February 2011).

<i>Brown bag seminars</i>	Training, information sessions or briefings during a lunch break where participants bring their own meals.
<i>Social media</i>	The use of web-based and mobile technologies for social interaction and interactive dialogue. User generated content blends technology and interactive dialogue. See: <a href="http://en.wikipedia.org/wiki/Social_media">http://en.wikipedia.org/wiki/Social_media</a>
<i>Cloud computing</i>	Storing files, databases and sometimes the software too on the internet rather than on a hard disk in the office. Makes material accessible from anywhere but dependent on a good Internet link. See Wikipedia, 2011. Cloud computing. [Online] (Updated 7 April 2011) Available at: <a href="http://en.wikipedia.org/wiki/Cloud_computing">http://en.wikipedia.org/wiki/Cloud_computing</a>
<i>Taxonomy</i>	A classification system to arrange materials, in this case by keyword or category. A folksonomy is a taxonomy with a free ranging list of keywords that are allocated by the users themselves.

All sites accessed 25 April 2011

## Introduction

Learning alliances bring together a range of complementary actors to discuss complex issues and look for ways forward. This implies a process that takes time and careful facilitation. The short cycles of action, reflection and planning needed by a learning alliance require facilitators to organise knowledge sharing and provide access to information quickly, regularly, concisely and in a targeted way, in order to keep momentum.

Communication is understood as not just about conveying information from one organisation, stakeholder group or individual to another. It is about involving learning alliance members and other stakeholders in joint learning and activities, increasingly building trust and social capital in the process. In this chapter we focus on knowledge sharing and information management.

## Learning alliance as a knowledge network

A learning alliance can be characterised as a knowledge network. It combines a large set of institutions and individuals, is organised through coherence (around a particular agenda) and its participation is loosely controlled (see Waddell and Khagram 2007). It is a knowledge network because its processes are knowledge-intensive, i.e. they involve a great many activities concerned with creating, sharing, applying and assessing knowledge. Learning alliances also produce a great deal of information that needs to be managed for effective dissemination and use.

Knowledge sharing in a network has specific challenges because members may not have the same values, interests, language and world views; their interests might even be conflicting. Experience in SWITCH revealed that differences in culture, working methods and disciplines of city alliance members were key challenges in the learning alliance process. Communication efforts that help alliance members develop a common understanding of the issue at hand and a shared vocabulary can support the process of moving beyond a platform for exchange to harnessing collaboration around a particular issue. At the same time learning alliances provide multiple sources of information and experience and multiple uses for it. If facilitated well, the multiple perspectives, or multiple knowledges (Brown, 2008) and sources of information that are brought together can offer a whole range of insights and joint learning opportunities.

Careful facilitation is needed to bridge the differences and translate the language of each stakeholder group to ensure effective communication and the involvement of all stakeholders. The role of a learning alliance facilitator is therefore to strike a balance: on the one hand taking advantage of the diversity and on the other hand ensuring there is common focus on the issue at hand. Diversity brings dynamism, but also the risk of lack of focus and dilution of the network (sometimes referred to as social entropy). Stability increases coherence but can also lead to tunnel vision or inactivity.

### Operational principles of communication in learning alliances

Effective communication in learning alliances follows some basic principles:

- It is interactive: communication in learning alliances is about engaging with stakeholders in an interactive way that contributes to deepening understanding and joint learning.
- It follows short cycles: while in conventional research projects insights and products are often disseminated at the very end, in learning alliances the aim is to quickly share preliminary data, insights and results, and to scrutinise them jointly so that a new understanding can emerge and research/ action can be adjusted.
- It is inclusive: learning alliances feed on the participation of various stakeholder groups, including social groups that are traditionally ignored or absent from reflecting and decision-making (e.g. communities, farmers, local civil society organisations). The language used, the atmosphere created and the practical arrangements around engagement of stakeholders will help determine to what extent different groups can effectively contribute to thinking and action in the alliance.

- It is targeted: in order to be useful, the specificities of key stakeholder groups must be considered and communication (and specific information products) can be targeted.

## Facilitation

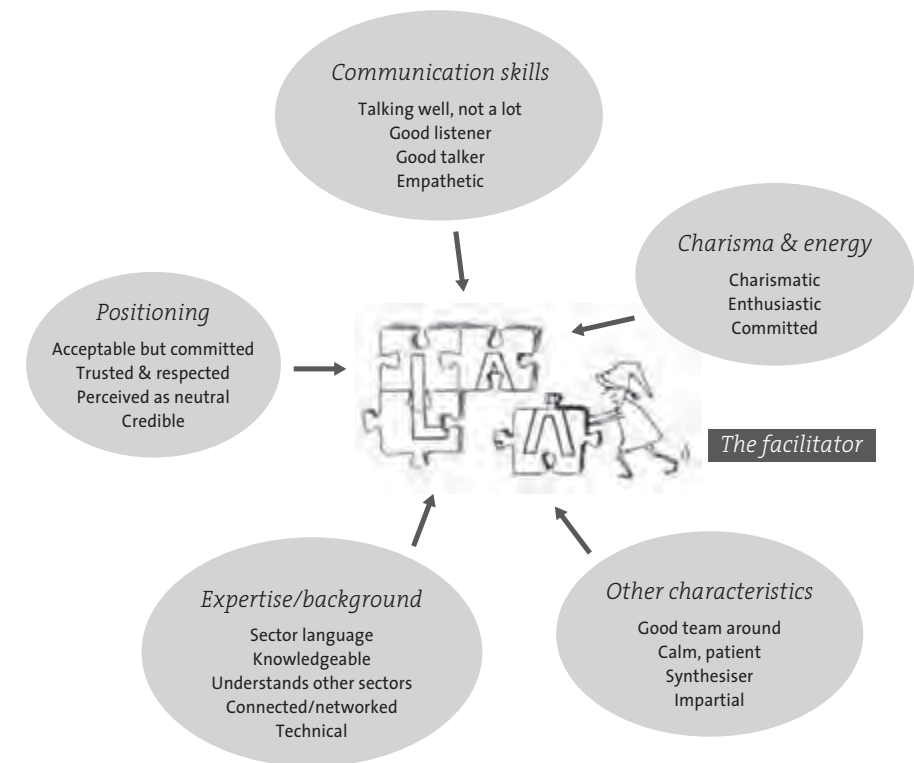
Learning alliances are created or promoted to work on complex issues or 'wicked problems' (Rittel, 1973). Experience in SWITCH and other projects that have followed a learning alliance approach has shown that the role of the learning alliance facilitator was central to the process. This goes beyond facilitating meetings and events and involves ongoing efforts to push and pull information, and to engage alliance members and stakeholders outside the alliance. The facilitator makes things happen, keeps people in touch and sees and responds to problems, not necessarily by making them go away, but by ensuring that they are addressed. A facilitator must be able to communicate with all sorts of people and on all sorts of topics, be eager to learn new skills and tricks and keep an eye on the flow of information and knowledge. The basics are 'collect' and 'connect'; collecting relevant and up-to-date information in a shared space and connecting people with resources and opportunities.

It is possible that vested and conflicting interests between stakeholder groups means that these stakeholders may be reluctant to sit around the same table and engage in a constructive dialogue. The facilitator therefore needs a certain degree of credibility among the stakeholders and probably some supporting champions to make this happen. The facilitator plays a key role in creating a conducive environment for cooperation, proactively pursuing opportunities to strengthen and expand the network.

## What does it take?

The role of learning alliance facilitator entails a number of competencies (to convene meetings, negotiate conflicts, document events *etc.*) that may not be found in one person. Facilitation of a learning alliance process may actually be best conducted within a small team. However, for the sake of simplicity we are here referring to 'the' facilitator.

Figure 3.4.1 The ideal profile of a learning alliance facilitator



It might be best to distribute the pool the ideal competencies of a facilitator among a small team. The profile of the facilitator depends on: expertise and background, positioning in the sector, communication skills and charisma/energy. In addition, this key individual should be impartial, calm, have a strong capacity to synthesise and a good team to support.

### Typical Activities for a facilitator

Learning alliance facilitators play a variety of roles but their mandate for communication revolves around the following areas: a) building the coalition b) building coherence c) building competency and d) building a collection of artefacts. In practice, these areas tend to overlap.

### Building the coalition (the actors)

The facilitator draws people into the network and should first and foremost ensure that activities bring members together and progressively bring more members to the learning alliance. The facilitator is critical in stimulating a common understanding, language and identity. He or she – in SWITCH nearly all the facilitators were women – needs to create an atmosphere of mutual support and encouragement and to build trust and nurture relations among alliance members.

This goes well beyond keeping a list of members (although that basic task also needs to be done) and includes introducing new members and being a matchmaker, managing conflicts and getting people to listen to each other. There are responsibilities also outside the platform in making the alliance and its purpose known among a wider group of stakeholders, representing the network in other forums and promoting its achievements. A “Who’s Who” list with contacts and information about learning alliance members and sub-groups will help members to know where knowledge can be found in the network and provide first time visitors with background information.

#### **Building coherence (the agenda)**

A knowledge network is usually structured by its own coherence, provided by the agenda around which members gather. That agenda is generally organised around the vision of the learning alliance, articulated around one or more strategies. Under this heading, the facilitator may therefore make basic information about the network and issues easily accessible, promote common purpose and goals, create a safe space where issues can be discussed, strengthen the sense of commitment and ensure that the information is well understood by all and that questions are addressed. It is important that face-to-face events are structured to build a common understanding and strengthen the network’s coherence.

#### **Building - or stimulating - competency (the abilities)**

The added value of a learning alliance is the complementarity of competencies and disciplines to adopt a more comprehensive and sustainable approach and to remain relevant over time. Relevant competencies available in the network should be nurtured and stimulated, and the capacity of the network needs to be built. The facilitator may bring in outside experts with relevant ideas and experiences, or organise exchange visits or e-discussions, and organise briefings and training courses to raise the capacity of the network. A regular task should be finding and signposting the availability of resources and opportunities outside the network, bringing in new knowledge and perspectives.

#### **Building an asset bank**

The learning alliance process will develop a number of assets which need to be taken care of and made available for others. The facilitator documents key processes to create various information products and outputs (briefing notes, information sheets *etc.*), and stores and archives information.

It can be seen from the list of roles and tasks described in this briefing note, that the learning alliance facilitator must be skilled, versatile, persuasive and innovative, with a good knowledge of the topic and excellent people skills. It is rare to find skilled and trained facilitators who come ready equipped to play all these roles. In practice the role is often taken up by someone with a commitment in the success of the learning alliance and a range of complementary skills which they increase both by formal training and by learning on the job. One of the most valuable assets that a learning alliance can create is the facilitator herself or himself. It is well worth investing in the training of facilitators who are knowledgeable about the sector and who can help alliances to bring about change.

## The challenges of networked communication

The facilitator plays a critical part in stimulating and supporting communication and knowledge exchanges but success also depends on the active participation of learning alliance members themselves, who may feel inhibited from sharing knowledge and experience at first, but who can also play a role in addressing common challenges that hinder networked communication.

#### **Sharing knowledge – hurdles and ideals**

Particularly at the onset of a learning alliance process, sharing knowledge or circulating information can be a challenge. There are many reasons for this. If familiarity and trust have not yet been built, knowledge may be perceived as a source of power and retained rather than shared. There may be competition for attention from other platforms, which results in some members showing little initiative. In addition, some institutions have a high turnover of staff and send new members to each meeting, so there is a lack of shared understanding about the issue and the history of the work.

Incentives are needed to sustain engagement in the learning alliance. These should not be monetary, as they trigger the wrong signals and are not sustainable. The best incentive over time is to stimulate an inclusive, participatory process where joint ownership is built and the process or results contribute to the members’ needs/ interests. Alliance members who are motivated champions can be instrumental in getting or keeping members on board.

#### **Translation and ‘traducture’**

Collaboration requires a shared commitment and a certain level of consensus. Each stakeholder group may experience reality differently and the different viewpoints, interests and language used to express them need to be bridged for communication to be effective.

Goldberg (2004) describes a gap between the worlds of research and policy-making, “a gap characterized by different needs, desires, and goals, different time frames for action, and different incentive and reward structures. Often, it seems as though the two groups not only come from different cultures but in fact speak different languages. As a result, communication between the two often falters, leaving both frustrated. Researchers do not understand why their research findings do not seem to find their way into policy. Policy-makers, on the other hand, do not always understand or find relevant research agendas or results, and, further, cannot always find the results in time to incorporate them into the decision-making process’ (p1).



Table 3.4.1 Possible incentives for participating in a learning alliance

Area	Potential incentives
Preparatory phase	<ul style="list-style-type: none"> <li>• The emergence of a structured analysis (the 'big picture') of an issue, roles or needs of stakeholders</li> <li>• A participatory (bottom up) approach to understanding and prioritising problems and designing joint actions</li> <li>• Including or focusing on areas that are not addressed in other initiatives/ platforms</li> <li>• Success in ensuring political engagement on something seen as a priority issue by stakeholders</li> </ul>
Participation	<ul style="list-style-type: none"> <li>• Working towards a common vision</li> <li>• Informing/educating members about how they will benefit from the learning alliance process</li> <li>• Inclusive communication (valuing views of all stakeholders; information sharing)</li> <li>• Creating a trend/fashion for the issue –e.g. through engaging with media</li> <li>• Focus on an existing conflict or felt need that generates stakeholder interest</li> </ul>
Research agenda	<ul style="list-style-type: none"> <li>• Focus research on real issues and needs</li> <li>• Demonstrate the usefulness of the research process</li> </ul>
Proving and improving	<ul style="list-style-type: none"> <li>• Providing research demonstrations</li> <li>• Creating indicators for sustainability</li> </ul>
(People and) Capacities	<ul style="list-style-type: none"> <li>• Capacity building (training course, exchange visit <i>etc.</i>)</li> </ul>
Other incentives	<ul style="list-style-type: none"> <li>• Building people's awareness about the issue and create a sense of urgency</li> <li>• Using regulations to ensure their participation</li> <li>• Organising informal gatherings to stimulate networking among alliance members</li> </ul>

Source: Based on session 6.2.2 at the Fifth World Water Forum (Learning alliances and multi-stakeholder processes in a world of change)

The learning alliance facilitator must be sensitive when translating the language from one knowledge community (or stakeholder group) to another. The concept of *traducture* (Wa Goro 2007) reminds us that translation is not only a matter of language, but of culture, power structures and perspectives, and that there is therefore a need for sensitivity. Learning alliances require careful considerations of such translating processes.

Engaging different stakeholder groups and meeting their information needs. An initial stakeholder analysis will help determine which stakeholder groups should be involved in the learning alliance because they have either an interest in the issue tackled or some influence on it – ideally a mix of both (see Guideline 3.2). Not all institutions will

become members of the learning alliance, although they may still be relevant. These stakeholders may be targeted with specific information products or influenced to adapt their behaviour. Similarly, while an organisation takes part in the learning alliance through one representative, another member of staff could be targeted by specific one-on-one advocacy activities.

#### Box 3.4.1 Language barrier examples from SWITCH

The involvement of members of the public, urban farmers or junior technical staff in SWITCH learning alliances was affected by differences of status and vocabulary. Such stakeholders may lack the skills and confidence to get involved. A SWITCH researcher based in Beijing noted the importance of language and social status and how these limit the scope of engagement in the action research process; “Planners and policy makers are used to working together, there is respect for researchers and they speak the same language. It is more difficult to have discussions between policy makers and farmers. Here there’s an issue of hierarchy and authority.”

There is also often a language barrier between research ‘specialists’ and ‘non-specialists’ (who may be very specialist in their own practice, rather than in theoretical terms). Overly scientific language can inhibit information exchange while policy and decision-makers often request short documents. Organising a training workshop for alliance members on a topic of their interest will help them to participate more confidently in plenary alliance workshops. Scientists can be asked to develop short briefing notes on key topics, suitable for a non-scientific audience. They may need help to explain issues in everyday language.

In SWITCH the main international scientific meetings and outputs were in English. While interpreters were sometimes available, non-English speakers found it harder to engage with the scientific meetings and to have their voices heard within the project.

A strategy for stakeholder engagement and communication should be considered from the start of the learning alliance. This strategy will identify primary and secondary target audiences and will include related communication activities, information products (and services) and communication channels that best reflect the needs and interests of the audiences. The strategy should be reviewed on a regular basis to adapt to changing objectives as the learning alliance is climbing the participation ladder (see Figure 3.4.2 below).

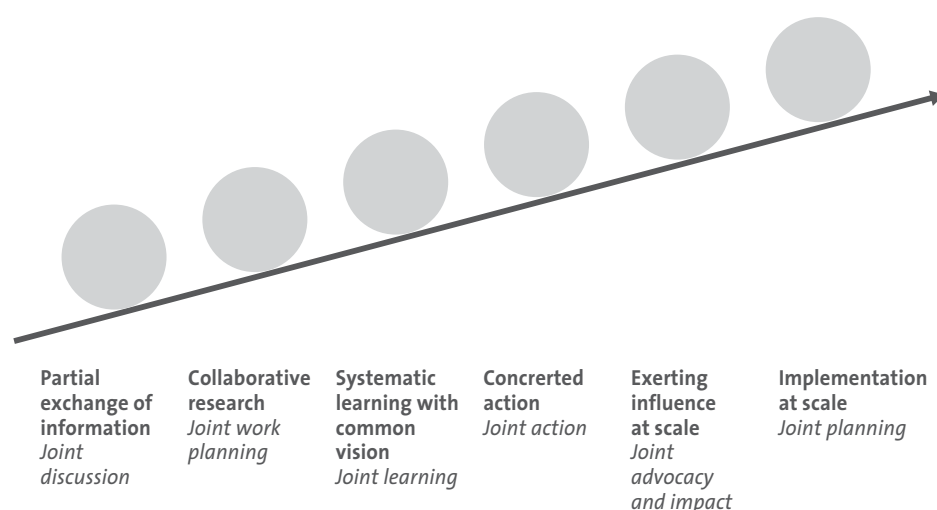
**Box 3.4.2 Some lessons from SWITCH on communicating with different target audiences**

- consider what advocacy and communication activities are needed with stakeholders outside of the alliance (for example national level bodies, other networks or key individuals)
- engage decision-makers as well as implementers
- engage the public through research demonstration sites
- build links with the media and local champions from the start of the process.

Each stakeholder (group) may have its own jargon, world view and preferred communication channels.

Typically policy-makers have little time to read and so tend to favour policy briefs, “brown bag seminars” and any form of direct contact where the information is brought in person (measuring up to the importance of its receiver). In the case of the RiPPLE project in Ethiopia, national level policy-makers received policy briefs in bilateral meetings with policy recommendations at hand, or were invited to presentations at the national forum (Forum for Learning on Water and Sanitation) when they could spare the time.

**Figure 3.4.2 A participation ladder for learning alliances, showing increasing degrees of interdependence and dictating a careful staging of communication activities**



Researchers, on the other hand, are often comfortable with long publications as they trawl through them on a daily basis and they are more likely to take note of peer reviewed articles. Material designed to influence academics needs to be well researched.

Regulators, engineers and development practitioners span a variety of profiles but they may enjoy more practical products and outputs such as guidelines, toolkits, checklists, posters, info-graphics, and ‘grey’ literature which is directly inspired from practice.

The media can be useful in influencing public perceptions and political priorities. Working with the media requires some patience and persistence as media interest in an issue may ‘switch on’ (or off) for reasons not always obvious to those working in the field. Media are generally interested in what affects people and they require information to be presented in plain language and easy to understand format. They like controversy which can be alarming for those used to working out of the public eye. The best way to engage the media is to note which media outlets and specific journalists have an interest in the issues being pursued by the learning alliance and establish direct contact with them. Work with media networks, and offer them workshops on the issues, exchange visits and where possible, field visits. You can also share videos through blogs and other social media. Although many journalists do not like being told what to write or broadcast, they are always grateful for good quality up-to-date information. Press releases are useful. Some media reproduce them more or less word for word. Others develop their own stories, but the press release is still useful as it acts as a record of your key messages as well as factual information and spelling of names *etc.* In the event of a disagreement about what was said it is important to have a record of your output. Press releases are also important bits of process documentation (assets) for the project.

Farmers, community members and most grassroots groupings may be partly illiterate. Communicating with them involves a lot of interpersonal (face-to-face) communication, use of participatory materials, pictures or photo stories but also can include radio programmes, community theatre *etc.* Simple written material can be useful especially material such as a poster that can be read out. SWITCH has a logo and this helps to ‘brand’ public material so that people come to recognise materials from the alliance.

For awareness raising and advocacy activities, useful materials may include:

- a flyer, a poster, some give-away gadgets (pens, calculators, T-shirts) and visuals that convey the purpose of the learning alliance
- a list of information products and services that the learning alliance offers
- a list of knowledge sharing mechanisms (workshops, exchange visits *etc.*) that participants can make use
- press releases and news bulletins that inform audiences about the initiative’s progress and process
- short stories and (print, audio or video) interviews that focus on human interest and are easy to read.

In a learning alliance process, face-to-face events represent key moments of crystallising the collective identity and agenda – and are indispensable to establishing the trust that will make knowledge sharing and cooperation possible. However, it is costly to bring all stakeholders together and yearly or quarterly conferences represent a sporadic way of learning and working together.

There are creative ways to stimulate the evolution of vibrant communities with sustained interaction. The interactive and demand-focused nature of social media allow for 'just-in-time learning' and for virtually non-stop cooperation. Social media can significantly reduce communication costs and allow regular information sharing – thereby reducing the risk of reinventing the wheel. While popular among some groups, social media may require training for others and will not suit every part of the learning alliance. In general, younger people are more used to using this form of communication.

It is very useful for the facilitator to be experienced in using and managing collaborative tools, including tele- and video conferences, and to moderate online conversations.

## From conversation to information: crafting communication products, channels and assets

As already indicated, the facilitator organises and facilitates knowledge sharing, and keeps track of the network assets in two specific ways: a) stewarding the codification of knowledge and b) managing information as part of digital weeding and maintenance.

### Stewarding the codification of knowledge

Members engage directly in activities, conversations, reflections and other forms of participation in learning. The facilitator ensures that all these forms of participation and the insights they lead to are documented and turned into information products – as traces of the knowledge capital developed by the learning alliance. This may be done by the facilitator directly or (better still) by other learning alliance members. This is an area where social media – if introduced properly and with training – can help to ensure a flow of regularly updated information.

In order to codify knowledge, the facilitator has to 'push' and 'pull' information: ask for feedback on ideas and documents, share experiences from the group and beyond, announce upcoming events and provide other relevant information in the alliance. This can be information for or about the alliance and its members. The facilitator stays 'in the loop' and brings information in by visiting events, subscribing to mailing lists and talking to people inside and outside the learning alliance.

A simple newsletter or email update with links to an intranet or website can be useful for sharing information, though it tends to be one-way communication. They are useful tools in raising the profile of the alliance and reaching out to new organisations and individuals who may wish to become involved. Especially at the start of the learning alliance, members are unlikely to contribute inputs to the newsletter or any sort of regular newsfeed. Interviews with learning alliance members are a good way to elicit contributions without the individuals having to write. However, the facilitator must ensure that this does not become a task that they undertake without support. The effort that goes into producing the first issue of a newsletter often leads to the second issue never appearing.

### Managing information – digital weeding and maintenance

Among the less thankful communication tasks that a learning alliance facilitator should undertake, is to manage the information assets. This entails:

Keeping track of the key information about the alliance i.e. maintaining or keeping:

- An updated address book – which can be turned into a public 'Who's Who' list with background information about learning alliance members and sub-groups. Adding photos can be helpful.
- An archive of email/group discussions (Google groups and other such platforms are great for providing traceability);
- An archive of advocacy and awareness-raising materials.

### Storing and archiving information:

Over time it becomes important to have a system for keeping track of activities and key events and to maintain a digital archive where information can be retrieved for reference. This may require also taking care of regular back-ups based on different physical solutions (or even storing all information on the web). If the set of information materials is large, a dedicated taxonomy becomes necessary. If the group works with a wiki or a blog this may become a 'folksonomy', i.e. a classification system usually based on tags and/or categories that participants have created themselves.

### Managing information and communication platforms:

If a learning alliance makes use of one or several digital communication platforms (wikis, blogs, discussion groups *etc.*) someone needs to clear requests for memberships, hold administrator and writing/editing rights, clear emails and other entries (if moderated). Finally, particularly if the platforms are open and welcome external comments and ideas, the facilitator should monitor user contributions and ensure timely feedback.

### Digital communication channels

Once information has been documented it can be shared in print with learning alliance members. However this option is costly, dependent on physical availability of the members and printing has an environmental impact. Digital communication channels offer a flexible set of solutions that can be tailored to the information and communication needs and behaviour patterns of the learning alliance members. Nowadays a number of solutions are even designed with a sharp eye for low-bandwidth issues (e.g. DropBox, YouSendIt, Google apps *etc.*).

The facilitator would be well advised to create an infostructure (information infrastructure) that supports virtual communication among learning alliance members as well as with external stakeholders. ICT (Information and Communication Technology) plays an increasingly important role in providing access to and use of information.

Common channels include:

- a website where key information is published and ideally where people can interact;
- an email discussion group (Dgroup, Google group, Yahoo! Group *etc.*) to share knowledge virtually any time;
- a group on Facebook or another social network (Ning seems to become a standard option and a number of WASH sector Ning groups exist already for specific themes or countries);

- a blog – which tends to work well for reflections and discussions on the basis of comments – the main blog platforms are Wordpress and Blogger;
- a jointly accessible calendar;
- a solution to share files and work collaboratively – either a wiki, Google document or online file-sharing system such as DropBox. Specific solutions exist for specific files: photos (Flickr, Picasa), videos (BlipTV, YouTube) *etc.* It can also be used for conducting polls, bookmarking internet sites and creating a shared database.

While digital options avoid a lot of the problems of print, they do carry their own risks, especially if some members have better Internet access than others. Remember that sending a digital file does not equate to it being read or even looked at. In SWITCH there were examples of a disappointing response to websites, email groups, blogs *etc.* This is a not a reason to give up on them, but the strengths and weaknesses of different methods have to be assessed.

#### Box 3.4.3 Skills to manage digital information and communication channels

A facilitator will need basic knowledge, skills and experience for the following activities to communicate:

- Summarising, drafting and publishing skills
- Synthesising skills to turn information bulks into compelling items
- Writing for the web and for various target groups
- Interviewing skills to tease out the stories and the 'human side' out of the work

Skills in video and audio recording, editing and management (also to upload on the web) are not a precondition but a definite bonus. The time to process these materials is high, but the benefits can be high also.

### Costs

The ideal network runs on its own, without external resources. In reality however, it usually takes a lot of effort (time and money) to run a network, even one with very active members.

In terms of time, learning alliances probably need:

- Coordination of events and of the learning alliance communication process generally: a minimum of 1 day a week depending on experience.
- 'Pushing' and 'Pulling' information around the network and pulling people into conversations: 1 day a week
- Documentation: The time will depend on the extent of documentation and the number of products such as a website, publications and newsletters. Process documentation (Da Silva Wells *et al.*, 2011) takes a lot of time but provides very good value for money as it continually informs activities and planning. See also Guideline 3.10.

It can be seen from this, that the facilitator function (whether done by one individual or a small group) is more than a half-time job and can easily become a full-time equivalent post.

Some €2000 per year might be needed to start a website, host a discussion group and build information repositories. The more the learning alliance relies on printed communication, the more costly communication becomes. It is wise to look for cost sharing opportunities and creative ideas for linking up with journalists, 'creatives', schools, other initiatives or stakeholder groups who are working on or are interested in the topic. In Lodz, the SWITCH team linked up with the film academy and local broadcasters, which resulted in free publicity and good quality creative outputs.

Before investing in any particular communication channel, the learning alliance facilitator (and members) should consider the necessity of those expenses, the importance of developing it internally or subcontracting it to professional agencies (better quality at a higher cost).

### Lessons from practice

#### Box 3.4.4 General communication tips and tricks

- Facilitators play an important role in encouraging communication in learning alliances, creating trust and managing conflict.
- Think about incentives for communicating, sharing information, seeking information and reacting to communication from the facilitator.
- Find creative ways to communicate (in particular) scientific results in more accessible ways and generally to craft specific messages for different target groups
- Create and preserve a safe and neutral space where differing views can safely be aired and asking questions is encouraged.

Experience shows that personal communication (visits by the facilitation or project team, face to face meetings with alliance members and phone calls) are often the most effective, but also the most time-consuming. Face-to-face meetings and well-facilitated learning opportunities stimulate members to engage, and these are appreciated and generate more activity/ feedback than non-personal or digital communication. A review of the city e-communication channels, including a web-blog, YouTube, and a picture site, showed very limited activity between 2006 and September 2009. City websites were established, but mainly provided one- way communication.

**Box 3.4.5 Striking a balance between digital and face-to-face communication**

- In Accra a SWITCH city webpage and Google group were set up in 2007, which the facilitator updated regularly. “I spent quite a bit of time learning how to use the website – I had never done a blog before so it took some time to figure things out”. However, there was very little or no response to messages from the Google Group or to information on the city website. “Most people don’t have easy access to internet. For persons at lower level management they may not even have computers or at best may have to share computers at the office. Where people have internet some are not very conversant with Google groups etc.” (source: SWITCH process documentation Accra Learning Alliance 2008).
- The Lodz alliance facilitator faced a similar challenge, although e-mail is perceived as more acceptable means of communication in Lodz: “The team now uses various means to communicate with the learning alliance members. Official correspondence is done through fax and telephone, while all reports and proceedings are sent by email and posted on the weblog which is also used for announcements. A database of addresses has been made and circulated to all members. At present, the weblog is not very user friendly.” (source: SWITCH process documentation Lodz Learning Alliance 2008).

## Summary

Communication in learning alliances is instrumental for successful processes and good results. Learning alliances are knowledge networks engaging their members in decentralised communication between various (and indeed varied) sources and recipients. This complex set up requires strong facilitation backed by a solid network, outstanding interpersonal skills, energy and enthusiasm. The facilitator or facilitation team tries to build the coalition, the coherence of the learning alliance around a specific agenda, the competencies of the group and the collection of artefacts (information products and services) that will be generated by the alliance.

However networked communication also poses a number of critical challenges such as deeply entrenched barriers to sharing knowledge, issues of translation and traducture across all stakeholder groups. There is a need to engage different groups in specific ways to meet their information needs. Ultimately, the conversations and transactions that are going through the learning alliance should lead to information, being codified from discussions and interactions; and this needs to be managed and maintained. All

communication activities come at a cost and every choice in the communication strategy needs to be justified. Facilitators need to find creative ways to keep and meet people’s interests and to get people talking and listening to each other.

### References

- Brown, V., 2008. *Leonardo's vision: a guide to collective thinking and action*, 16. Sense Publishers: The Netherlands.
- Goldberg, S., 2004. *You say 'to-may-to(e)' and I say 'to-mah-to(e)'* Bridging the Communications Gap Between Researchers and Policy-Makers (Canadian Population Health Initiative, Canadian Institute for Health Information). In: CPHI workshop Report “Moving from Research to Policy: Improving the Health of Canada’s Youth 19-20 Feb 2004. Canada. [Online] Available at: [http://secure.cihi.ca/cihiweb/products/CPHI\\_Bridging\\_Gap\\_e.pdf](http://secure.cihi.ca/cihiweb/products/CPHI_Bridging_Gap_e.pdf) [Accessed 25 April 2011].
- Nonaka, I. & Takeuchi, H., 1995. *The Knowledge-Creating Company--How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press: Oxford.
- Rittel, H., & Webber, M., 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4, pp.155-169.
- da Silva Wells, C. et al., (in press). *Documenting change: an introduction to process documentation*. IRC International Water and Sanitation Centre: The Hague, The Netherlands.
- Waddell, S. & Khagram, S., 2007. Multi-stakeholder global networks: emerging systems for the global common good. In: Glasbergen, P. et al. eds., 2007. *Partnerships, governance and sustainable development: Reflections on theory and practice*, pp. 261-287. Edward Elgar Publishing: United Kingdom.
- wa Goro, W., 2007. Problematizing the gaze through traducture. Does it matter if you’re black or white? *White matter/Il bianco in questione*. Athanor, 17(10), pp. 52-61.
- Wenger, E., White, N. & Smith, J.D., 2009. *Digital habitats: Stewarding technology for communities*. CPSquare Press: Portland, Oregon.

### Related websites and further reading

- Network management tools: <http://www.cap-net.org/databases/network-management-tools>. Cap-Net provides an overview of network management tools including ideas to develop and structure communication activities.
- Network participation, governance and learning systems: <http://networkingaction.net/2011/02/network-participation-governance-and-learning-systems-a-conversation-with-steve-wadell/> Gives a good overview of different types of networks and of ways to deal with governance and participation in the networks.
- Work the Net; A management guide for formal networks (2006, GTZ, SKAT) <http://www.skate.ch/publications/prarticle.2005-09-29.9740306251/skatpublication.2007-09-11.3490812587>
- This guide is filled with tips, tricks and a nicely structured overview on how to run a network.
- Successful Communication (Hovland, ODI): A Toolkit for Researchers and Civil Society Organisations. 2005. <http://www.odi.org.uk/resources/details.asp?id=155&title=successful-communication-toolkit-researchers-civil-society-organisations>. Basic toolkit for learning alliances when starting to communicate with alliance members.
- IRDC’s Working Together - Online Facilitation <http://archive.idrc.ca/books/848/work.html>. An information guide organized according to the stages a facilitator goes through in preparing to use an electronic mailing list to work productively with a group of people.
- Bridges Not Walls. A book about interpersonal communication. Steward J. (ed). 1973 Book about verbal and non-verbal codes, selfdisclosure, empathic listening, conflict and different approaches.
- All sites accessed 25 April 2011.

## 3.5

An open sewer running through Teshie in Accra, Ghana. (Photo credit: Kwasi Attafuah)

# Rapid urban water assessment

Charles Batchelor, John Butterworth and Marieke Adank

*Finding sustainable solutions to meeting the demand for water services in growing urban areas is a challenging task for today's decision makers. Rapid urban water assessment can help provide clarity on the key technical and institutional problems and reveal mismatches between supply, demand and actual access to water related services. It can also highlight information gaps and help a range of stakeholders to develop future strategies and plans. This chapter presents the Resources, Infrastructure, Demand and Access (RIDA) framework for assessing supply (resources and infrastructure), demand and access. RIDA was used in SWITCH as a framework for analysis and planning in the learning alliances.*

## Key concepts

### RIDA

RIDA is an analytical framework that helps to structure information relating to water services in a logical and transparent way. By examining both the supply side (resources and infrastructure) and the demand and access, barriers and potential solutions can be identified. The analysis considers both technical and societal aspects of water systems.

### Resources

Water resources are accessed according to quantity and quality, temporal variability and their location. The assessment of water resources can also take account of water policy and the institutions responsible for managing and regulating the use of water resources.

### Infrastructure

Infrastructure consists of physical constructions and organisational structures that abstract, treat, convey and deliver the resource to the end users. It includes methods used to collect, transport, treat and dispose of wastewater.

### Demand

Demands reflect the different needs for water services, and may include domestic needs, small-scale productive needs, irrigation, industrial or other uses as well as the need for sanitation services. There will be a variety of, often conflicting, demands in a given constituency.

### Access

Access refers to whether people's demands are met. Examining barriers to equitable access is key to planning for sustainable solutions to integrated urban water management.

<i>Optimal ignorance</i>	Understanding the difference between what is worth knowing and what is not. This avoids collection of too much irrelevant data.
<i>Appropriate imprecision</i>	Recognises that much information is collected with an unnecessary degree of precision, out of line with the precision of other information.
<i>PRA tools</i>	Participatory rural appraisal tools involve stakeholders in the collection and analysis of information and in processes of change. They have spread beyond rural settings and are now known simply as PRA tools.

## A challenging context

Population growth, increasing per-capita water use and rapid urbanisation all contribute to escalating water demand in urban and peri-urban areas. Water uses in urban and peri-urban areas are also significant sources of pollution that can impact on the availability of safe water locally and/or in downstream areas. Urban environments modify flood risks, while traditional flood plains disappear as people choose to live and work close to attractive waterfronts. In many areas, access to safe water and sanitation is far from equitable and large numbers of people are unable to access water according to national and international norms. Decision makers in the water sector confront a complex challenge in meeting current levels of demand, knowing that the more progress they make in providing water to users at affordable prices, the more demand will increase. This sets the bar still higher to succeed in ensuring that all demands are met while the risks of pollution and flooding are minimised and mitigated.

The encouraging news is that, in most cases, a wide variety of options exist to tackle this challenge and the paradox that the greater the success, the greater the remaining task becomes. These options include managing demand, improving operation and maintenance (reducing non-revenue water), increasing stakeholder participation, improving governance and augmenting supply. ‘Natural’ approaches to engineering, such as the creation of wetlands, optimise ecosystem properties for water absorption, pollution reduction and ecosystem regeneration. This offers new options for stormwater management and flood risks mitigation, while also providing economic and social benefits.

In summary therefore, decision makers in the urban water sector face increasingly complex problems and a complex series of new options for tackling them. What is the best framework for analysing, modelling and discussing the potential impacts and utility of these different options? And since these problems and options are context specific, how can the selected option(s) be best matched and adapted to the specific context of any given urban or peri-urban area.

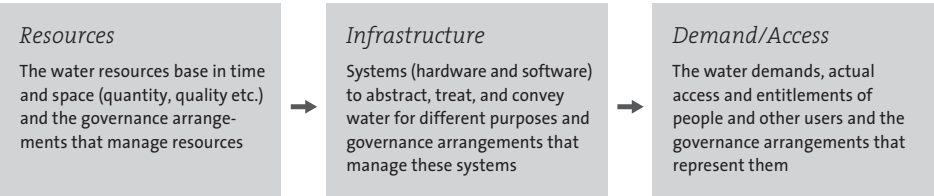
## The RIDA Framework

The Resources, Infrastructure and Demand/Access (RIDA) framework is one way of tackling these complexities. It is an analytical framework that allows for considering different aspects of the water sector- from protection of sources, to supply, to improving access and managing demand. For example, there is a need to meet people’s demand for safe water, there is a demand for wastewater drainage and a demand for space close to rivers and attractive waterfronts. The framework is attracting increasing interest because it can be used to structure stakeholder dialogue, data analysis and modelling for integrated urban water management. An important aim of using the RIDA framework is to ensure that the analysis of urban water systems considers both technical and societal aspects of the systems.

The RIDA framework is based on the understanding that water resources are linked to users by infrastructure, and that each of these three system elements (resources, infrastructure, users) has its own set of institutions, boundaries and other characteristics. This means that three sets of largely independent physical/institutional boundaries need to be systematically considered when discussing or analysing urban water issues. Although there are four items in the RIDA framework, there are only three sets of information because demand and access are considered together as two sides of the same coin – demand cannot be separated from the ability of people to access water. For example, the framework may be used to examine if 100 per cent of the population has access to their minimum water requirements, while also seeing how demand increases and considering how it can be managed without depriving people of their rights to water for drinking, cooking, washing, household use and livelihoods.

The first step in the RIDA analysis is to identify and categorise existing data according to the Resource-Infrastructure-Demand-Access framework. Figure 3.5.1 provides an example of the framework with a focus on water supply. Information is collected with the assistance of local stakeholders.

Figure 3.5.1 The RIDA framework



It is only possible to solve water problems once the fundamental causes have been identified. The RIDA framework can be used to structure analysis and discussions relating to complex water management systems that have, for example, multiple sources, complicated infrastructural systems that have been developed over a long period of time, service providers with unclear mandates, and multiple competing demands for scarce resources. It presents a logical structure to the information and allows for greater transparency. An important aim of using the RIDA framework is to ensure that the analysis of urban water systems considers both technical and societal aspects of (lack of) access to water services.

The RIDA framework can be used to structure analysis of relatively straightforward water delivery systems by highlighting the fundamental causes of water supply problems. For example the root causes of these problems could be resource-related (falling river levels), related to infrastructure (ageing and leaky pipe network, insufficient human resources among service providers), or societal (people in informal housing/ slums excluded from the piped network). The framework can also be used for analysis of other aspects of the urban water cycle, such as sanitation or flood control.

In the context of integrated urban water management, the RIDA framework can also be used by a learning alliance or other platform to structure the analysis of complex governance systems and to map the level of participation of stakeholders in different aspects of the governance. The RIDA framework can also help to structure analysis of the level of legal entitlement that users have over access to water related services, like water supply for different uses, wastewater management services or protection from flooding, under a range of conditions that may vary in space and time.

Finally, the RIDA framework can help in the development of appropriate sustainability indicators and in providing structure to monitoring systems aimed at tracking the performance of the components of a water infrastructure system and the urban water management system as a whole. Box 3.5.1 provides an example of how the RIDA analysis was used by the learning alliance in Accra.

#### **Box 3.5.1. Using the RIDA framework in Accra, Ghana**

The Accra Learning Alliance undertook a strategic planning process for improving integrated urban water management in the city of Accra. This process started in 2007, when the learning alliance was established and a vision for water management in the Accra of the future was developed. This vision was refined during a workshop, when the Accra Learning Alliance identified the lack of a comprehensive data and information base on water management in the city as a key challenge in developing a strategic plan towards achieving the vision. SWITCH partners took the lead in collecting and compiling secondary data and information, but learning alliance members were instrumental in making the required information available. This led to the “Accra Starter kit”, a CD Rom with data and information on water management in Accra. The RIDA framework was used to structure and analyse the available data and information on different elements of the urban water cycle (water supply, excreta and wastewater management, stormwater management and the use of storm- and wastewater for urban agriculture). A comprehensive analysis of the water management situation in the Greater Accra Metropolitan Area (GAMA) was presented to and verified by the Accra Learning Alliance in June 2009 and presented to the National Level Learning Alliance Platform in November 2009.

The data and information were also used to develop narrative future scenarios (for more information on scenario building, see chapter 6). The situational analysis took into account the whole water cycle: water supply, excreta and wastewater management and stormwater management.

The situational analysis and the scenarios formed the basis for learning alliance members to explore strategies for addressing current and future challenges related to integrated urban water management. A series of learning alliance workshops resulted in 2010 in the publication of the proposed strategic directions for improving integrated urban water management in the Greater Accra Metropolitan Area.



These aims can be achieved by considering the sorts of questions listed in Box 2. This example focuses on water supply. Other questions could be more relevant for sanitation, flood control or wastewater related issues. It is important to be clear about the objectives for using the RIDA framework – there is no point in using it unless it will improve planning or water sanitation and hygiene governance processes.

## Getting started

Materials and resources needed for developing and using a RIDA framework will depend on scale and level of complexity of the system being studied.

The following will be required in most cases:

- A specialist or a group of specialists with a good understanding of technical and societal aspects of the complete water delivery system.
- Experienced facilitators who have a good knowledge of the water sector and are able to facilitate stakeholder dialogue at different levels.
- Specialists with good information management, data analysis and, possibly, modelling skills.
- Access to good quality information. In most cases, this will require the support and interest of senior professionals in relevant government line departments and/or water utilities.
- Sufficient time and resources to work interactively with relevant stakeholders and/or a learning alliance.

### Box 3.5.2 Example of questions for water supply structured using a RIDA framework

Resources:

- What water resources are drawn on by the water supply infrastructure to provide for different uses (consumption, industry and commercial use, market gardens and livestock)?
- What is the sustainable quantity of acceptable quality water that providers can supply?
- What other demands are made upon the water resources?
- What major institutions are involved in managing water resources? What are their roles and responsibilities? How effective are they?

Infrastructure:

- What are the main physical elements of the water infrastructure (reservoirs, canals, treatment plants, piped networks *etc.*)?
- What is the capacity of this infrastructure (storage, treatment, supply, and disposal) to meet demand?
- What institutions are involved in water service delivery?

Demand/Access:

- What are the different kinds of water user (households, industry, agriculture, leisure *etc.*)?
- What is the demand for water from these different water users and societal groups (quantity, quality, reliability, location)?
- What existing access do different groups of users have to water now; to what extent is demand satisfied?
- Are certain groups excluded from access to water services?
- What are the coping strategies of those who cannot reliably access services?
- What are the key water related institutions relevant to the various water user groups?
- What barriers to access are experienced by different water user groups (high user fees; requirement to have membership of associations, lack of tenure, *etc.*)?

## Methodology

The following are a set of generic steps that can be used to develop and use a RIDA framework. Although presented as a stepwise process, in practice it is often necessary to repeat steps iteratively.

**Step 1: Discuss and agree objective.** Discuss and reach agreement on the objective(s) of developing and using a RIDA framework. Objectives could be, for example, to produce a water resource assessment, a schematic diagram (see Figure 3.5.2) or a disaggregated vision (see Figure 3.5.3).

**Step 2: Discuss and agree the area, domain and scale of interest.** This should lead to agreement on the extent and boundaries of the area(s) and domain(s) of interest to be covered by the RIDA framework and subsequent analysis. Discussion should include consideration of whether analysis of historical trends is required and, if so, over what time period, and should also include consideration of the societal and technical scale(s) of interest. For example, societal scales of interest could be one or all of the following: household, community, urban district and/or city.

**Step 3: Identify available resources for developing and using a RIDA framework.** This will determine the time available for analysis and/or discussions, the financial and human resources that can be used, the potential level of stakeholder participation and whether or not capacity building is required.

**Step 4: Identify information required to achieve the objective(s) identified in Step 1.** The information is what might usefully be structured in a RIDA format. A check list of questions that might need to be answered is provided in Box 3.5.2. This list can be modified according to objectives of specific discussions or analysis. Table 3.5.1 is a check list of the components and type of information that might be needed.

**Step 5: Identify sources of information.** A brainstorming session with knowledgeable specialists is usually a good starting point for identifying sources of existing information. They should also be able to comment on the quality of the existing information so you can decide whether or not primary data collection will also be required.

**Step 6: Create an information base.** Information collected should be quality controlled and stored in an information base. Ideally, the storage structure should reflect the RIDA components, for example, by using different worksheets within a spreadsheet to summarise each RIDA component.

**Step 7: RIDA analysis.** RIDA analysis can involve such activities as: institutional and decision mapping, water balance analysis and modelling. The difference between RIDA analysis and standard information analysis lies in the use of the framework to structure analysis and outputs.

**Step 8: Disseminate outputs.** Although the analysis and modelling may be sophisticated, the resulting outputs should be in a form that can be understood easily by potential users of the information and structured in a RIDA format. Work therefore is needed to make sure that the outputs are clear and straightforward and do not use a lot of technical terms or jargon.

Table 3.5.1 Example of an information check list focusing on water supply issues

Main Components		Information
Resources	Rainfall	• Rain gauge locations, rainfall records and rainfall intensity information
	Inter-basin transfer	• Flow measurement in transfer canals
	Runoff	• River-gauging data and water quality information • Catchment areas and characteristics (slope, soil type, land use etc)
	Groundwater (sustainable yield, recharge)	• Geological information • Ground water level and water quality information • Research study outputs
	Wastewater return flows	• Gauging and water quality information
	Infiltration	• Soil type, land use and slope • Research study outputs
	Evaporation	• Published potential and/or actual evaporation data • Land use information (especially irrigated areas)
Infrastructure	Storage structures	• Size, location and operating rules of reservoirs, etc,
	Irrigation and drainage networks	• Location, layout and operating rules of irrigation schemes including pumping stations and major canal headworks
	Inter-basin transfer supply	• Location, layout, capacity and operating rules of IBT (inter-basin transfer) systems
	Urban water supply networks	• Location, layout, capacity and operating rules of urban water supply networks
	Wells	• Location, depth, size of pumps • Information on extraction rates
	Unaccounted for water	• Research study outputs • Supply company estimates
	Household and user connections	• Metering information • Supply company estimates

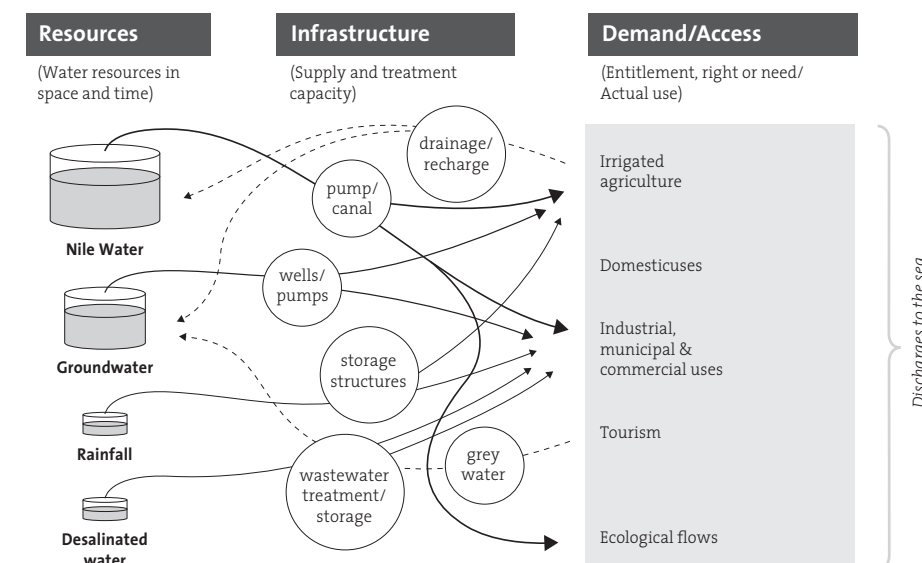
Demand	Irrigation demand	<ul style="list-style-type: none"> <li>• Terrestrial and remotely-sensed information and statistics</li> </ul>
	Domestic demand	<ul style="list-style-type: none"> <li>• Estimates based on census data and government norms, on household surveys and water supply company statistics</li> </ul>
	Demand for small-scale productive water uses)	<ul style="list-style-type: none"> <li>• Estimates based on census and market survey data and household surveys</li> </ul>
	Industrial, municipal and commercial demand/access	<ul style="list-style-type: none"> <li>• Estimates based on surveys. Local government and water supply company statistics</li> </ul>
	Environmental and ecological demand	<ul style="list-style-type: none"> <li>• Hydro-ecological modelling and surveys of aquatic habitats</li> </ul>
	Irrigated agriculture	<ul style="list-style-type: none"> <li>• Comparison between areas that could be and actually are irrigated using remotely-sensed information.</li> </ul>
	Irrigated agriculture	<ul style="list-style-type: none"> <li>• Comparison between areas that could be and actually are irrigated using remotely-sensed information</li> <li>• Farmer surveys</li> </ul>
	Domestic use	<ul style="list-style-type: none"> <li>• Comparison between supply and demand measurements</li> <li>• Household surveys and analysis of complaints information</li> </ul>
	Small-scale productive uses	<ul style="list-style-type: none"> <li>• Comparison between supply and demand measurements</li> <li>• Household surveys</li> </ul>
	Industrial, municipal and commercial demand	<ul style="list-style-type: none"> <li>• Comparison between supply and demand measurements</li> <li>• Surveys and analysis of complaints records</li> </ul>
	Environmental and ecological use	<ul style="list-style-type: none"> <li>• Comparison between supply and demand measurements</li> <li>• Surveys and habitat monitoring</li> </ul>

### Challenges and tensions

A well-worked RIDA framework helps to bring order to apparent complexity and, in so doing, helps to structure stakeholder dialogue and specialist analysis or modelling. However, a number of challenges and tensions often crop up. These include the following:

**Fuzzy boundaries:** The societal and technical boundaries between the three components of a RIDA framework (i.e. between Resources and Infrastructure and between Infrastructure and Demand/Access) can be quite fuzzy. For example, in a heavily-engineered river basin almost all surface and ground water resources are related to infrastructure. In such cases, a decision has to be made on, for example, whether a river system should be classified as a resource or part of an infrastructural system.

Figure 3.5.2 RIDA schematic diagram for water use in Alexandria



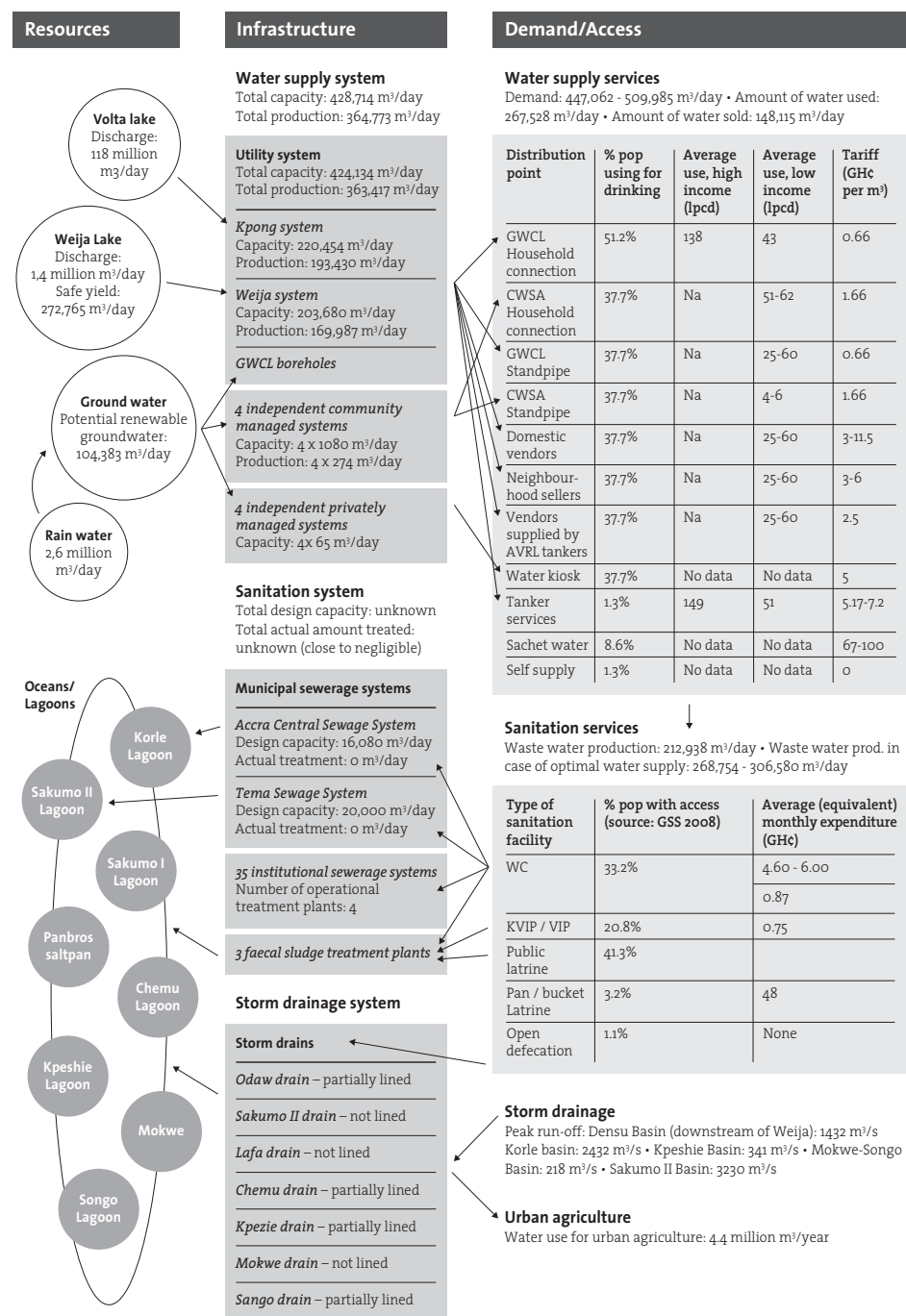
**Quality and availability of information:** It is easier to produce a schematic diagram of a water delivery system in RIDA format than it is to populate this diagram with good quality information. Some information may be of acceptable quality, while other information may be out of date or plain wrong. The key is to ensure that sufficient time and resources are allocated to quality control and to verifying information. Data may not be easily accessible and may be held by different organisations and, in some cases, by different departments or individuals within these organisations. Restrictions may also exist on the sharing of information particularly information that is regarded as being sensitive (e.g. costs of constructing infrastructure). Building trust and commitment among learning alliance members to the RIDA framework and its aims are therefore key.

**Spatial and temporal scales:** The spatial and temporal scales at which data have been collected by different organisations are often inconsistent. This can necessitate disaggregating or aggregating information on different components of a system. This takes time and, in many cases, results in a reduced confidence in the quality of the information.

**Level of detail:** There is a tendency, particularly in interdisciplinary teams, for specialists to want to collect information in more detail than is really necessary. Collecting and processing information is costly, and should therefore always be clearly appropriate for the actual decisions and problems within a paradigm of 'optimal ignorance' and 'appropriate imprecision'.

**Range of formats:** Information is usually held in a wide range of different formats (text, tables, figures, maps, remotely-sensed images *etc.*) and different media (reports, hard disks, the internet, journals *etc.*). It is easy to underestimate the time needed to reconcile information that has been stored in different formats using different media.

Figure 3.5.3 RIDA analysis of water management in Accra (2007)



It is usually more useful and efficient in terms of resources to collect and reconcile information that relates specifically to the interfaces of the RIDA framework – in other words that cross the boundaries between resources, infrastructure and demand – as opposed to collecting information haphazardly across the whole urban water system (see Table 3.5.2). An example would be data on the water that flows from the water resource into the water supply infrastructure, and then data on the return discharges into rivers or groundwater.

Table 3.5.2 RIDA interfaces

RIDA interfaces	Example focus of RIDA analysis
Resources – Infrastructure	Extraction estimates: Volume and quality of water in space and time entering into water supply infrastructure. Volume and quality of return flows to rivers or groundwater
Infrastructure – Demand/Access	Delivery estimates: Volume and quality of water delivered at the point of supply to different users in space and time. A measure of unaccounted for water can be based on difference between extraction and delivery estimates.
Demand-Access	Water poverty estimates: The extent to which delivery of water meets the demands of users (including the environment) in space and time.

### Lessons from SWITCH

Collecting information on the interface between resources, infrastructure demand and access will help stakeholders identify key challenges in water management. In Accra, for example, the learning alliance identified the following challenges related to water supply, based on the RIDA interfaces of the situational analysis presented in Figure 3.5.3:

- **Resources – Infrastructure:** The availability of water resources is not an immediate challenge.
- **Infrastructure – Demand:** The water demand is higher than the capacity of the systems providing services to the Greater Accra Metropolitan Area (GAMA). The design capacity was 84-96 percent of the 2007 demand, while the 2007 production was 72-82 percent of 2007 demand.
- **Infrastructure – Access:** The amount of unaccounted for water is very high (the amount of water sold was 59 percent of the amount of water produced in 2007).
- **Demand – Access:** Low income households use less water than high income households but pay more per unit water.

Although the data available on the RIDA interfaces related to excreta and wastewater management in Accra was less detailed, the learning alliance was able to identify the following broad sanitation challenges:

- Infrastructure – Demand: There is a lack of treatment capacity to deal with the amount of faecal sludge and wastewater generated.
- Infrastructure – Access: Existing excreta collection and treatment facilities are not functional.
- Demand – Access: Low income households depend on public latrines, providing lower services levels against higher prices.

The RIDA methodology can be a useful tool to structre joint reflection and analysis in a learning alliance. It can be applied to different aspects of the water cycle, and is relevant in different contexts. Box 3.5.3 presents some tips and tricks on using the framework.

Box 3.5.3 Tips and tricks

- An important aim of using the RIDA framework is ensure that the analysis of urban water systems considers both technical and societal aspects. The trick is to ensure that an appropriate balance is achieved when considering these two aspects.
- The boundaries between elements of RIDA are not always clear. Defining them is something that is best done in a local context as part of the stakeholder dialogue process. Deciding how to treat and interpret different data may also call for expert involvement.
- A key part of populating a RIDA framework is deciding on information that can be collected from secondary sources and information that will involve primary data collection. Typically user-related data (demand, access, local institutions) requires mostly primary data collection, often using a range of PRA tools<sup>4</sup>; while water resource data is usually collected from secondary sources. Information about infrastructure typically requires a mix of both.
- RIDA analysis rarely takes place at a single scale. The area of interest may start with the area where demand and access are being assessed – but it must follow the logic of the system to identify problems and opportunities to meet that demand, which could lead to considering an entire city or river basin, looking at supply infrastructure and identifying potential water resources.

Acronyms

GAMA	Greater Accra Metropolitan Area
PRA	Participatory Rural Appraisal
RIDA	Resources, Infrastructure, Demand and Access

Summary

The RIDA framework can help stakeholders to structure water service related information in a logical and transparent way, to improve planning and governance and to develop appropriate indicators for monitoring. Using the framework requires some expert inputs and the involvement of a range of stakeholders to provide and assess the required information and numeric data. Doing such an analysis can also help highlight where good quality and up-to-date data are lacking or contribute to discussions about social exclusion. By examining institutional as well as social and physical aspects of supply, demand and access it can contribute to integrated urban water management.

Related websites and further reading

More about how to do a RIDA assessment can be found on the websites of EMPOWERS: [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120) under Guidelines, Methods and Tools, Chapter 5.

Moriarty, P. *et al.*, 2007. The EMPOWERS approach to water governance: guidelines, methods and tools. Amman, Jordan: Inter-Islamic Network on Water Resources Development and Management, INWRDAM. [E-book] Available at: [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120) [Accessed 26 April 2011].

For an example of a situational analysis of water management in SWITCH, using the RIDA framework, see:

Adank, M., *et al.*, 2011. Towards integrated urban water management in the Greater Accra Metropolitan Area. Current status and strategic directions for the future. Accra, Ghana: SWITCH/RCN Ghana, (in press).

For an example of a water services assessment that was structured using the RIDA framework, see: Food and Agriculture Organization of the United Nations, 2006. Malta: Water services review. [Online] Available at: <http://www.fao.org/docrep/009/a0994e/a0994e00.htm> [Accessed 1 june 2011].



*“Nothing is more obvious than the unpredictability of the future” (Ratcliff, 2002). In planning processes, we cannot escape from the dilemma that all our reliable knowledge is about the past, whilst all our decisions are about the future. Scenarios can be used to address this dilemma in a systematic and strategic way. In particular, scenarios help to identify the most uncertain and most important factors that are outside the direct control of the stakeholders and are therefore most likely to disrupt plans. Scenario building can be a very creative and enjoyable process that inspires stakeholders into identifying and discussing uncertainty and risk. Specialists play a supporting role in this process and facilitation is needed to ensure that decision-makers and other stakeholders move beyond present knowledge and realities and consider possible future developments. This guideline describes the conditions and steps involved in scenario building, identifies tensions, pitfalls and things that work.*

Experts exchange views at Zaragoza water treatment plant, Spain. (Photo credit: Peter Bury)

# 3.6

## Scenario building

Charles Batchelor and John Butterworth

### Key concepts

Scenario	A plausible and internally-consistent description of a possible future situation as determined by those factors that are considered most important and most uncertain.
Scenario building	The process of developing scenarios.
Local factors	Factors that can be controlled or mitigated by the stakeholders themselves.
External factors	Factors that are outside the control of the stakeholder.
Vision	A concise description of a desired future state.

## Introduction

Uncertainty in the water sector has become so pronounced that it may, arguably, render futile, if not counterproductive, planning processes based on probabilities and extrapolation of current trends. So, what can we do? One option is to use scenarios and scenario building as an integral part of planning processes. The main purpose of scenario building is to enable a learning alliance or a stakeholder platform to identify, evaluate and take explicit account of a whole range of uncertain factors that might either support or derail strategies and plans that are aimed at achieving a shared vision, by which we mean a concise description of a shared future state.

Scenario building is essentially a team exercise that can help a group of stakeholders to come to terms with uncertainty and risk in a planning process. In particular, scenarios can be used to identify the most uncertain and most important factors that are outside the direct control of the stakeholders. Experience has shown that these uncontrollable factors are most likely to disrupt plans, rather than factors that, although very important, are predictable and under the control of stakeholders tasked with implementing strategies and plans.

Scenario building forces stakeholders to confront key beliefs, to challenge conventional wisdom and to really think outside the box (rather than just say that they are doing this!). It also forces stakeholders to think imaginatively and systematically about the multitude of inter-sectoral issues and factors that, in the future, will have an increasingly important impact on the water sector, such as peak oil (after which global petroleum production starts a terminal decline) or climate change.

Scenario building is used routinely throughout the fields of industry, commerce and government, but its use in the water sector and urban planning is limited. In other sectors, scenario building is an integral part of planning processes and time and other resources are routinely allocated to develop the skills required to construct and use scenarios effectively.

Scenario building can be a very creative and enjoyable process that inspires stakeholders into identifying and discussing uncertainty and risk. While a scenario process should not ignore lessons learnt from early projects and programmes, it is important that stakeholders recognise that the future rarely resembles the past. Scenario building shows its real worth as part of a planning process when change is rapid and unpredictable.

Some example scenarios for the city of Accra developed in August 2007 by the SWITCH learning alliance are shown in Box 3.6.1.

## Getting started

**Facilitation** for scenario building includes organising and facilitating stakeholder meetings and workshops, documenting the outcomes of these events and circulating resulting materials to the participants. Ideally, facilitators will have a good knowledge of the water sector and training and experience in the use of facilitation techniques.

**Specialist support** is often needed to prepare materials for meetings and workshops. These materials can include reviews and copies of existing scenarios for the area or domain of interest. Specialist support may also be necessary to ensure that scenarios are internally consistent and based on accurate evidence and knowledge (rather than hear say and intuition).

**Credible support** is desirable for the group of stakeholders involved in scenario building to have credibility and legitimacy, and this should include the support of democratically-elected representatives.

**Marginalised** The group of stakeholders, learning alliance or stakeholder platform should be gender aware and proactive in involving or representing marginalised social groups.

Box 3.6.1 Accra Scenarios for 2030

- Scenario I: Accra in 2030 is a depressing, chaotic and crisis prone town. Severe water shortage is the norm, with an outdated and under-designed water supply system failing to meet the needs of a population that has exploded to 5 times its 2007 level. Adequate sanitation seems an increasingly distant dream – with the majority of residents lacking access to the most basic facilities. Ever increasing quantities of urban waste lie uncollected in the streets, and outbreaks of cholera and other diseases are an annual occurrence in the city’s high density slums. Lack of effective political leadership, coupled with poor economic performance and severe poverty mean there is little ability to tackle deep seated problems of under-investment and poor management of water supply and sanitation infrastructure. Problems are made worse by lack of raw water resources due to increased competition and a 20% reduction in river flows.
- Scenario II: Accra in 2030 is a city facing serious water and sanitation related challenges, but quite confident in its ability to meet them. Very rapid population growth, fueled in part by strong economic performance based on oil wealth, has led to sharply increased demand for water (10 times what it was in 2007). This demand has been increased by the growth in the tourism and manufacturing sectors. However, while rapid, growth has not been chaotic due to a marked improvement in political culture and related enforcement of planning laws and other regulations. Climate change, and competition for water from outside the city, has led to a modest reduction in overall water resource availability which together with the strong growth in demand presents a major challenge. These challenges are compounded by low access to finances and shortages of land for new infrastructure. However, improved management and capacities within GWCL and AMA, new technological options, and engaged and empowered citizens inspire confidence that solutions will be found.
- Scenario III: Accra in 2030 poses a range of serious challenges to water managers and service providers. Steady population growth means three times more people live in the city than in 2007, while overall demand has grown four-fold, driven also by tourism and industry. Economic growth has been reasonable, fuelled in part by new oil wealth. However, oil wealth has also led to a marked deterioration in the quality of public life, with a lack of trust developing between citizens and leaders. This lack of trust spills over to all those institutions associated with ‘the government’, resulting in low levels of willingness to pay for services, and high levels of illegal use of water infrastructure. High demand for water coupled with serious reductions in flows in the Volta and Densu mean a constant shortage of raw water, much of which is then lost in an antiquated pipe network. Financing is difficult to come by, and coupled with lack of willingness to pay, leaves utilities constantly cash strapped. Lack of land for new facilities and a lack of enforcement of existing regulations mean that pollution from the growing mountain of waste is widespread and disease outbreaks are on the rise.
- Scenario IV: Accra in 2030 is in many ways a blessed city. Contrary to the fears of many in the early 2000s, the city’s population growth has been high but manageable (2.5 times 2007 levels). The frequent power-shortages of the early 2000s are only a distant memory. A sharply improved political culture has led to improvements in enforcement of planning laws, whilst policy is seen as progressive. This, coupled with strong economic growth (partly driven by increasing oil wealth) has led to marked improvements in citizens’ willingness and ability to pay for water and sanitation services. Challenges do exist. Overall water resource availability is reduced, and high losses from the pipe network remain a problem. It continues to be difficult to source the necessary financing to upgrade the city’s infrastructure, and access to land for waste processing facilities and new networks is a constant problem. Nevertheless, there is guarded optimism about the ability of the city to deal with these problems.

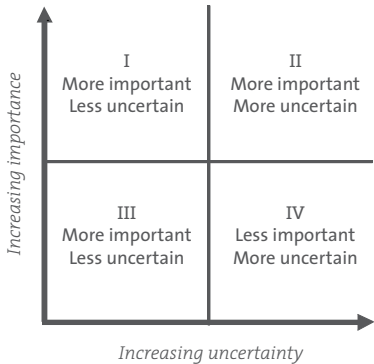
# Methodology

Although scenario building can be carried out as a stand-alone activity, it is normally used as part of a planning process. Ideally, scenario building follows the development of a shared vision and an initial assessment of the status of water resources and trends in water supply in demand in an area or domain of interest. There are many different methodologies that can be used to build scenarios. These all have their advantages and disadvantages. However, a generic stepwise approach to scenario building is as follows:

**Step 1: Brainstorm factors.** As part of a card exercise in a stakeholder workshop, brainstorm all the factors that will affect achievement of a vision. This brainstorming should be wide ranging (i.e. thinking outside the box). During this step, it is often useful to ask stakeholders to consider factors that had a bearing on the success or failure of ongoing or completed projects or programmes. At the end of this brainstorming, ask stakeholders to discuss whether some factors should be discarded on the basis that they have no relevance to the area of interest.

**Step 2: Separate the factors into local and external factors.** As a continuation of the card exercise in Step 1 (i.e. using the same set of cards), separate the factors into local and external factors. Local factors are those that can be controlled or mitigated in some way by the stakeholders themselves (e.g. lack of skill or capacity can be overcome by organising a capacity building programme). External factors are those that are outside the control of the stakeholder (e.g. climate change, global economic trends). The difference between these two types of factors can be fuzzy, so do not be overly dogmatic. If it goes well, this discussion can be highly illuminating for a group of stakeholders because it helps them to differentiate between the perceived and actual boundaries on the control that they may have over implementation of an integrated urban water management strategy.

Figure 3.6.1 Importance and uncertainty matrix





**Step 3: Rank factors according to importance and uncertainty.** As part of the card exercise, classify the external factors according to Figure 3.6.1. This figure can be drawn up as a wall chart to which cards are attached. The factors in the upper-right quadrant (the more important and more uncertain) are used to differentiate between possible futures described by the scenarios.

On the basis of discussion, it is preferable to limit these more important, more uncertain factors to two or three, as this reduces the number of possible combinations and hence scenarios. It is advisable to take time over this exercise because strong differences of opinions can occur. If it is facilitated well, this exercise provides an opportunity for lively discussion around these differences of opinion and, over time, for consensus to be reached.

**Step 4: Agree on the states of external factors.** Discuss and fix different future states for each of the “more important, more uncertain” external factors that were selected in Step 3. These states should be the realistic upper and lower limits of these factors at a specified time in the future (see Table 3.6.1 for an example from the city of Lodz in Poland). These values can be set on the basis of the views of the stakeholders, expert opinion, rigorous statistical analysis or some combination of all of these methods. In other cases, it makes sense to adopt values that have wider government, scientific and/or public recognition.

**Step 5: Create outline scenarios.** The outline scenarios are created by taking the all possible combinations of the states of the selected external factors. So, if two external factors have been selected each with two states, the number of outline scenarios will be four. If three external factors have been selected each with two states, the number of outline scenarios will be nine. Table 3.6.1 shows the start of a process in Lodz, Poland, with two external factors (GDP and the water governance framework). The Lodz outline scenarios are the combinations of the lower and upper states of the external factors (e.g. I = AC, II = AD, III = BC and IV = BD).

**Step 6: Create narrative scenarios.** After the workshop, a nominated individual or small group with good writing skills should convert the outline scenarios into narrative scenarios. This is achieved by adding a background story to each of the outline scenarios. This background story should be based partly on the less important and less uncertain factors that were identified in Step 3. The background story should also use information on the area of interest.

**Step 7: Name the scenarios.** Select evocative and memorable names that represent the essential logic for each scenario. Meaningful and vivid names stand a better chance of being accepted, remembered and used by stakeholders during planning processes. It is best, however, to avoid using normative words such as “good”, “bad” or “most likely”. All scenarios should be equally valid although they are not necessarily equally likely to occur. A truly robust strategy must enable the vision to be achieved under all of the scenarios.

**Step 8: Test and evaluate the scenarios.** Review available information to check the validity of the descriptions of external factors and the values that have been given to the states of the most important and most uncertain states. Check the internal consistency of individual scenarios again by reviewing published information or by using modelling techniques. Finally disseminate the scenarios to the groups of stakeholders and specialists and ask for feedback on their plausibility and validity.

Table 3.6.1 Lodz scenario external factors for 2038

More important, more uncertain external factors	Lower and upper states
Macro-economic status	A: Current GDP per capita (€4,800)
	B: GDP per capita that is the same or above the EU average (€22,860)
Macro water governance framework	C: Current fragmented approach. Low-level political support for IUW governance
	D: IUW governance that has political support at all levels and leads to effective implementation of the Water Framework Directive (WFD)

### Characteristics of a good scenario

Although there are many different processes that can be used for scenario building, scenarios that can improve planning process have certain common characteristics.

These include:

- The scenarios have a logical structure and are internally consistent.
- The scenarios are equally plausible and take full account of existing information and knowledge.
- The scenarios are a mix of narrative and numerical information. As such, they can be used for specialist activities (e.g. as a basis for modelling the ability of strategies to achieve the vision under different scenarios) and non-specialist activities (e.g. as a component of awareness campaigns).
- The scenarios may take account of a wide range of factors but give particular weight to the most important and most uncertain factors that are outside the control of the stakeholders who are ultimately responsible for implementing the resulting plan – stakeholders make plans within their control to meet factors outside their control.
- In the context of a planning process, good scenarios will always challenge and surprise. Bad ones merely confirm current conceptions and perpetuate personal prejudices.
- The scenarios have the ownership of the stakeholders and the narratives have a local flavour.

### Challenges and tensions

A well-crafted set of scenarios is said to lure decision-makers outside the comfort and familiarity of their traditional mind sets. A number of challenges and tensions must be dealt with.

These include:

- Present versus future. Decision makers have to respect and reconcile simultaneously present realities with the logic of plausible futures. This requires a good understanding and analysis of drivers of change.
- Closed versus open-ended. Scenarios can be constructed with very specific strategy decisions in mind, or they may be developed to help decide which strategy decisions should be analysed.
- Grounded versus imaginative. Good scenarios are both thoroughly researched and thoroughly imagined, whilst bad scenarios rely too heavily on uninformed speculation and are poorly researched. However, a balance between detailed study and unfettered creativity needs to be struck.
- Intellectual versus emotional. In a similar vein, scenarios are necessarily an intellectual and analytical activity, but they must attempt also capture the emotions of those who develop and implement them.
- Advocacy versus dialogue. Good scenarios are likely to be built when individuals advocate their point of view and argue the importance of different factors. However, once scenarios have been selected, a more reasoned dialogue is needed among all those concerned.
- Scepticism versus expertise. Expertise is essential in the analytical process of scenario building, but because the future can be so different to the past, a healthy scepticism should be maintained about the pronouncements, judgements and assessments of experts. This scepticism should compel decision-makers to reflect critically upon each scenario's logic and plausibility.
- Probability versus Plausibility. One of the most contentious debates concerning the use and development of scenarios centres on the assignment of probability to the final scenarios. One school of thought argues that not assigning probabilities is a 'cop-out' because probabilities give decision makers important information on which to base their strategies. Another school believes that assigning probabilities is a 'hangover' from the days when forecasters really thought they could predict the future. In most cases a balance needs to be struck between basing scenarios entirely on statistical analysis and ignoring statistics altogether.

Boxes 3.6.2 **Lodz Scenarios for 2038 developed with members of the Lodz Learning Alliance in April 2008**

**Scenario I:** The economy remains stagnant owing to a series of worldwide economic recessions and poor performance of the Polish economy owing to political instability, a shortage of labour, and poor infrastructure. Incomes/output remain similar to 2008 (GDP of Euro 4,800 at current prices) and the country is one of the poorest within a highly unequal Europe. There are low tax revenues and little external funding for investment in improving infrastructure (richer countries with the EU have stopped supporting major investments in the Centre and East). Institutions dealing with water management at a city level remain highly fragmented with different agencies dealing with various issues and poor coordination between agencies and departments, partly as a result of politicisation of local government. Nobody is looking and planning to improve overall performance of the water management systems, but only at their individual areas of responsibility. As a consequence, the city's water governance system have been slow to adapt and respond to the challenges posed by climate change (increasing frequency of droughts and floods) and the rising costs and absolute shortages of fossil fuels. Despite the efforts of individuals and localised success stories, the state of the city's urban environment has deteriorated. WASH service levels have are unacceptable in many areas of the city.

**Scenario II:** The economy remains stagnant owing to a series of worldwide economic recessions and poor performance of the Polish economy owing to political instability, a shortage of labour, and poor infrastructure. Incomes/output remain similar to 2008 (per capita GDP of Euro 4,800 at current prices) and the country is one of the poorest within a highly unequal Europe. There are low tax revenues and little external funds (richer countries with the EU have stopped support major investments in the Centre and East) to invest in improving infrastructure. Despite the above, strong leadership and professionalism within the various organisations dealing with aspects of water management in the city (and its catchment areas) leads to improved sharing of information and coordination. An integrated plan is developed (largely based on the water framework directive) and implemented to use water wisely and improve the environment. However, shortage of tax revenues has limited the scope for the major investments needed for the city's authorities to adapt and respond effectively to the challenges posed by climate change and the increasing costs and absolute shortages of fossil fuels. Lack of investment funding has meant that the city's emphasis has been on promoting and encouraging action by community-based groups. Whilst this local action has been successful, it has not been able to impact on all the challenges facing the city. Inequities exist in WASH service levels and the urban environment is much better in richer areas of the city.

**Scenario III:** The Polish economy develops steadily to become the largest in eastern and central Europe and average in terms of performance across the whole of the EU, closing the gap with western European countries (with a GDP equivalent to the EU average: Euro 22,860 at current prices). Many young people who migrated to the UK, Ireland and other EU countries in the first decade of the century return to the city owing to the better wages and prospects. This results in a sharp recovery in the population, a rise in investment and a reverse "brain drain". Much higher tax revenues can be invested in infrastructure improvements, and people are also able to pay much higher fees for services. The institutions dealing with water management at a city level remain highly fragmented with different agencies dealing with various issues and poor coordination between agencies and departments, partly as a result of politicisation of local government. Nobody is looking and planning to improve overall performance of the water management systems, but only at their individual areas of responsibility. Investment needed to address the increasing challenges of climate change and the rising cost and absolute shortages of fossil fuel is poorly targeted. In fact, much of it has been wasted! Individuals and urban "landcare" groups have achieved a lot as a result of the strong support and involvement of environmentally-minded returnees. As a result of disillusionment in government, these groups have turned a coalition of landcare groups into a strong political voice. However, the ability of local action to address major problems is quite limited. There is a growing gap between the rich and the poor in the city. Landcare groups tend to be more active and successful in the richer areas of the city. Similarly, WASH service levels tend to be much better in the richer areas.

Scenario IV on next page...

**Scenario IV:** The Polish economy develops steadily to become the largest in eastern and central Europe and average in terms of performance across the whole of the EU, closing the gap with western European countries (with a per capita GDP equivalent to the EU average: Euro 22,860 at current prices). Many young people who migrated to the UK, Ireland and other EU countries in the first decade of the century return owing to the better wages and prospects available at home, leading to a sharp recovery in the population. Much higher tax revenues can be invested in infrastructure improvements, and people are also able to pay much higher fees for services. Strong leadership and professionalism within the various organisations dealing with aspects of water management in the city and its catchment leads to improved sharing of information and coordination. An integrated plan is developed (largely based on the water framework directive) and implemented to use water wisely and improve the environment. The city has responded and adapted famously to the challenges posed by climate change and the rising costs and absolute shortages of fossil fuels. Environmental plans are well aligned across all the sectors and the city's environment has never been better for all the city's inhabitants (and for its flora and fauna). WASH service levels are also outstanding across the whole city. A combination of local action and innovative city governance has resulted in Lodz being a leading proponent in integrated urban water management (IUWM) and a source of IUWM expertise that is in high demand across Europe and worldwide. The city has achieved all aspects of a vision that was formulated by a "turning point" project (we think it was called SWITCH?) in the first decade of the century.

Examples developed with members of the Lodz Learning Alliance in April 2008

**Box 3.6.3 Tips and tricks**

- Separating local from external factors is not easy. Stakeholders typically focus on the former. Prolonged facilitation is needed to encourage stakeholders to have the confidence to consider and voice opinions on external factors.
- Developing scenarios is as much art as science. Ideally those tasked with writing scenarios should have journalistic or creative writing skills.
- Similarly, the presentation of scenarios in meetings can be made more interesting and thought-provoking if some creativity is used. For example, by asking stakeholders (or even professional actors) to enact scenarios.
- It is best not to rush scenario building. In the context of a multi-stakeholder planning process, as much value can be gained during discussions from discussions during the scenario building as from the final outputs (i.e. "Remember that happiness is a way of travel - not a destination").
- There is a tendency to give specialists the leading role in a scenario building workshop. In most cases, it is better specialists support the process but stakeholders build the scenarios.
- It takes some time before stakeholders (and even facilitators) start to appreciate the value of scenario building as part of a planning process. Often senior-level champions are needed to ensure initial resistance to change is overcome.
- Scenario building is not about 'knowing the future', or always being right; it is about trying to minimise the chances of being seriously wrong.

# Summary

Provided the process is well facilitated, scenario building can be a creative and inspiring process for identifying and discussing uncertainty and risk. It can help identify possible strategies and a shared vision of the future based on current trends and knowledge of sources of greatest uncertainty. Scenario building brings together a wide group of stakeholders, including specialists and high-level decision makers. Narrative scenarios contain both quantitative and qualitative information and focus on factors outside of the control of stakeholders which are most important and most uncertain.

**Acronyms**

AMA	Accra Metropolitan Assembly
EU	European Union
GDP	Gross Domestic Product
GWCL	Ghana Water Company Ltd.
IUWM	Integrated Urban Water Management
WASH	Water, Sanitation and Hygiene
UK	United Kingdom

**References**

Ratcliffe, J., 2002. *Scenario Building: A Suitable Method for Strategic Construction Industry Planning?* [Online] Available at: [http://buildnet.csiir.co.za/cdcproc/docs/1st/ratcliffe\\_js.pdf](http://buildnet.csiir.co.za/cdcproc/docs/1st/ratcliffe_js.pdf) [Accessed April 2011]. (An excellent review of the history of scenario building and relevance of scenario building to the construction industry. This guideline draws extensively on this paper).

**Related websites and further reading**

EMPOWERS Project: This project adapted visioning and scenario-based planning methods to participatory planning of water projects in the Middle East. The publication *Guidelines, Methods and Tools* describes how scenario building can fit into a wider planning process. The guidelines contain details on how to use time series analysis. [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120)

Wikipedia: Information relating to forecasting, backcasting, trend analysis and other techniques that can be useful when building scenarios. [http://en.wikipedia.org/wiki/Futures\\_techniques](http://en.wikipedia.org/wiki/Futures_techniques)

JISC infoNet: This UK site includes a comprehensive set of resources on scenario planning. [www.jiscinfonet.ac.uk/tools/scenario-planning/evolution](http://www.jiscinfonet.ac.uk/tools/scenario-planning/evolution)

Shell: The oil company Shell benefited from scenario-planning to become the second biggest oil company in the world after the 1970s oil price shocks. This site explains their approach, and includes a report on energy scenarios to 2050. [http://www.shell.com/home/content/aboutshell/our\\_strategy/shell\\_global\\_scenarios/](http://www.shell.com/home/content/aboutshell/our_strategy/shell_global_scenarios/)

Fonseca, C. & Moriarty, P., 2006. WASH scenarios for 2015: A trends analysis paper [Online] Available at: <http://www.irc.nl/page/28445> [Accessed April 2011]. In this paper, IRC use scenario planning methods internally and with partners to look at how their core business - supporting access of poor people to water, sanitation and hygiene - might change over future decades.

*How can we design robust strategies for urban water management in the city of the future, in an era of uncertainty? This guideline builds on the earlier work on visioning and scenario building and presents a methodology for strategy development to meet different future scenarios.*

## Key concepts

<i>Strategy</i>	A medium to long-term planning framework within which specific activities are described and plans implemented. Over time, and effective strategy should lead to a vision being achieved.
<i>Scenario</i>	A plausible and internally-consistent description of a possible future situation, a story about the way an area or domain of interest might turn out at some specified time in the future. Scenario building or development is the process of developing scenarios. See Guideline 3.6.
<i>Vision</i>	A concise description of a desired future state. Visioning is the process of developing a vision. See Guideline 3.3.
<i>Adaptive management</i>	In complex and rapidly changing situations there is never sufficient information to reach a settled “optimum” decision. Flexible planning backed by strong monitoring and information management allows constant adaptation of plans and activities.
<i>Project cycle management</i>	The concept that a project or programme proceeds through evolutionary stages that should be managed as a process rather than a series of one-off events.

# 3.7

Brainstorming on solutions in the city office, Lodz, Poland. (Photo credit: Carmen da Silva Wells)

## Strategy development

Charles Batchelor and John Butterworth

## Introduction and overview

In the context of integrated urban water management (IUWM), the main aims of strategy development based on visioning and scenario building are to:

- develop a robust adaptable strategy that has the potential to achieve a shared vision under a whole range of different scenarios (i.e. different futures)
- encourage stakeholders to take the leading role in an IUWM strategy development process.

Figure 3.7.1 provides a schematic overview of the concept of strategy development based on visioning and scenario building. At its simplest, the approach involves three phases. First, stakeholders develop a shared vision of the water services and environment that they would like to achieve at some specified time in the future. Second, stakeholders develop a set of plausible (although not necessarily equally likely) scenarios that describe different futures. Third, an overall strategy is developed that integrates various components so that it has the potential to achieve the shared vision regardless of which scenario, over time, turns out to be closest to reality. This overall strategy may, in practice, be simple or very complicated depending on the context and the time horizon of the vision. Each of these phases is described in more detail in this briefing note.

The advantages of this approach compared to more standard approaches to strategy development are many and varied. The use of visioning and scenario building stimulates social and organisational learning and provide a process for enhancing stakeholders' understanding of how to prepare for and manage change, risk and uncertainty. Equally important, the approach helps stakeholders think creatively about important and uncertain factors over which they have no or very limited control. The net result should be that stakeholders are less likely to fear or ignore these factors and are more likely to consider how they could thrive in a range of future settings. Some of these may be strikingly different to anything that they have ever experienced.

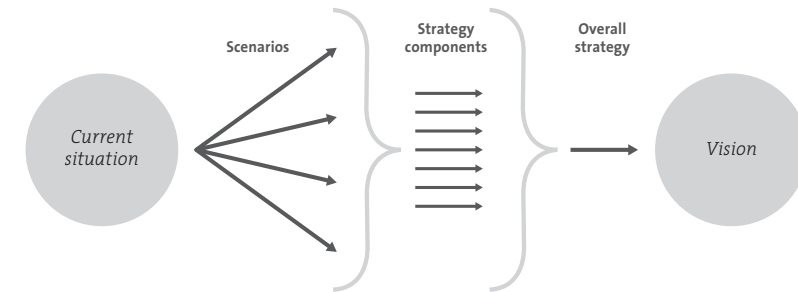
Active stakeholder participation in strategy development, if facilitated well, has the potential to improve both the utility and ownership of the resulting strategy. Activity participation also ensures that stakeholders gain an understanding of their own roles and responsibilities and the potential benefits of working constructively with other stakeholders within an IUWM framework.

An important strength of the overall approach is that strategy development is not based on unique forecasts of future conditions that might influence the environment and both supply and demand for water services. In contrast, the approach acknowledges that, even with the best forecasting methodologies, the future is unknowable and, in most cases, robust adaptable strategies are needed that recognise this uncertainty. In simple terms, this strength is achieved by making stakeholder dialogue, visioning and scenario building core elements of the strategy development process rather than useful accessories.

Although strategy development based on visioning and scenario building is not in common use in the water sector, it is far from being new and unproven. This approach has been used by other sectors (government, business and the military) for 40 years or

more. By contrast, where visioning and scenario building are used in the water sector, they are usually treated as stand-alone techniques rather than as part of a concerted and participatory approach to improving the processes of strategy development.

Figure 3.7.1 Strategy development based on visioning and scenario building



Strategy development gives prominence to uncertainty, risk and change, which is consistent with the principles of adaptive management. Adaptive management is based on the recognition that in a complex and rapidly changing situation there can never be sufficient information to reach a settled “optimum” decision. Hence, the emphasis should be on flexible planning backed by strong monitoring and information management systems that allow constant adaptation and the upgrading of plans and activities.

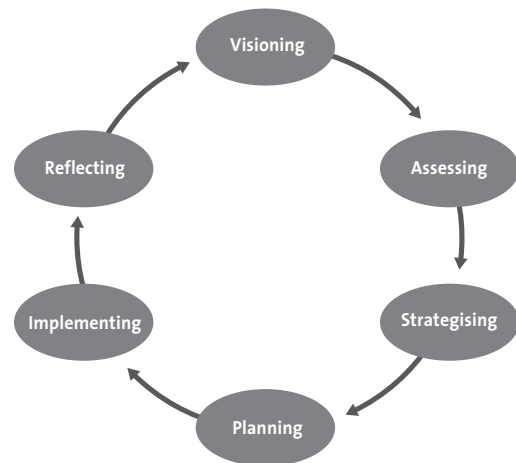
Strategy development based on visioning and scenario building is also consistent with a project cycle management (PCM) approach to IUWM and, more specifically, with the emphasis on social and institutional learning.

### Box 3.7.1 Lodz vision 2038

The city's resources management is based on an efficient and integrated system ensuring access to information for all. Investors and authorities respect ecological properties of land and waters. Infrastructure serves the functions and requirements of an environmentally secure city, is reliable, meets the needs of the entire city's population and assures good status of aquatic ecosystems. Green areas - river valleys along open corridors - provide space for recreation and are the 'green lungs' of Lodz. The application of ecological biotechnologies and the population's common and in-depth ecological awareness contributes to exceptional quality of life. Our city is a leading centre for innovation, education and implementation in Poland.

Developed by the Lodz Learning Alliance in January 2008

Figure 3.7.2 An example of a project management cycle



## Getting started

Visioning, scenario building and a water resource assessment (using the RIDA framework) are pre-requisites for strategy development.

**Facilitation.** The approach to strategy development described here requires the active support of a facilitator or a facilitation team over a period of many months. Ideally, facilitators will have a good knowledge of the water sector and training and experience in the use of a range of facilitation techniques.

**Specialist interdisciplinary support** is usually needed to prepare materials for strategy development meetings and workshops. These materials should include reviews, descriptions and rigorous assessments of potential strategy options and opportunities. Rather than taking responsibility strategy development, the role of specialists is to support stakeholder dialogue and, more specifically, to help stakeholders understand the potential implications and tradeoffs associated with different strategy options.

**Credible support.** Ideally, to have credibility and legitimacy, a strategy development process should involve and/or have the active support of democratically-elected representatives.

**Marginalised groups.** To have credibility and legitimacy, the learning alliance or stakeholder platform should be gender aware and proactive in involving or representing marginalised social groups.

## Methodology

The following set of steps can be used to develop a strategy based on visioning and scenario building. The exact sequence of steps, number of iterations and the time that might be needed will depend on the context. If the process is to produce a robust and adaptable strategy, it is crucial that each step involves stakeholder dialogue that is structured around achievement of the common vision under the whole range of scenarios.

**Step 1: Identify components of an overall strategy:** As preparation for and/or during a learning alliance meeting, brainstorm and list practical options and opportunities that could become components of an overall strategy that has potential to achieve the common vision. Suggestions for these strategy components are likely to originate from many sources. Some will be based on existing practices others might be entirely new to the stakeholders in the area of interest.

**Step 2: Evaluate each strategy component:** Assess the social, technical, political, economic and environmental viability and acceptability of each strategy component, especially those that are new to the stakeholders. This assessment is likely to be carried out by specialists working with stakeholders who may have a particular interest in some or all of the strategy components. The assessment should use a range of techniques (including modelling) but, regardless of the technique, specific consideration should be given to whether the strategy component is well matched to the challenges and context of the area of interest. By the end of this step, a range of strategy components should have been rigorously assessed and either rejected or adapted to the specific context of the area of interest.

**Step 3: Identify specific risks and constraints:** For each strategy component selected and adapted in Step 2, identify the risks or constraints that could influence whether or not the strategy component has the potential to achieve the vision (or parts of the vision). In most cases, these factors will already have been identified and ranked as one step of the scenario building process. If so, this “scenario building” list of factors can be used as a starting point for carrying out this step. Finally, check whether there are risks that certain strategy components, if implemented, will impact negatively on the viability of other strategy components or on water users or the environment outside the area of interest. At the same time, attention should also be given to identifying whether particular synergies could result from implementing certain sets of strategy components as part of an overall strategy. By the end of this step, some strategy components will have been rejected, synergies between some strategy components will have been identified and the potential impacts of strategy components outside the area of interest will have been elaborated.

**Step 4: Link strategy components to relevant parts of the vision.** Using a disaggregated form of the vision as a starting point, link and group strategy components to relevant parts of the vision, as shown in the example in Table 3.7.2.

Table 3.7.2 Provisional assessment of Lodz strategy components (April 2008)

Vision elements	Strategy components	Scenarios			
		I	II	III	IV
The city's water resources management is based on an efficient and integrated planning system...	<ul style="list-style-type: none"> <li>Alignment of plans across different sectors (within context of an overall spatial development plan)</li> <li>Institutional collaboration strengthened</li> <li>IUWM planning processes and management systems adopted</li> <li>Emphasis on managing demand (and thereby improving efficiency)</li> </ul>	x	√	X	√
...ensuring access to information for all.	<ul style="list-style-type: none"> <li>Policy of free and open access to information adopted</li> <li>Common information is set and a team to manage, update and quality control is established with a secure line of funding</li> <li>Information made available in a form that can be understood by non-specialists</li> </ul>	x	√	?	√
Investors and authorities respect ecological properties of land and waters	<ul style="list-style-type: none"> <li>Environment impact assessments included in the IUWM planning process</li> <li>Investment plans evaluated and approved against environmental criteria</li> <li>Best management practices are encouraged as an integral part of planning and implementation processes</li> </ul>	x	√	?	√
Infrastructure serves the functions and requirements of an environmentally secure city...	<ul style="list-style-type: none"> <li>Existing infrastructure upgraded to meet current and future demands</li> <li>Sustainable use of available water resources by protecting sources (quantity and quality), developing alternative sources, managing demand etc</li> <li>Adoption of polluter pays principles</li> <li>Challenges linked to peak oil, climate change, etc considered in IUWM strategy</li> <li>Alignment of with urban plans that reduce urban sprawl (and therefore demand for urban transport other than walking and biking), increase potential of urban gardening etc.</li> </ul>	x	√	?	√
...is reliable...	<ul style="list-style-type: none"> <li>O&amp;M systems that are well resourced</li> <li>Peoples' awareness built to reduce pollution, vandalism etc.</li> <li>Infrastructure that can perform even during extreme events (floods)</li> </ul>	?	√	√	√

Table 3.7.2 Provisional assessment of Lodz strategy components (April 2008)

Vision elements	Strategy components	Scenarios			
		I	II	III	IV
...and assures good status of aquatic eco-systems	<ul style="list-style-type: none"> <li>Mainstreaming ecological principles into decision-making</li> <li>Managing ecological flows and groundwater levels (maximising infiltration)</li> <li>Managing quality and enforcing regulations</li> <li>Separating stormwater and sewage flows (ensure treatment)</li> </ul>	x	√	X	√
Green areas - river valleys along open corridors – provide space for recreation...	<ul style="list-style-type: none"> <li>Protection within land use plans, including identification of what recreation is permissible</li> <li>Promoting novel partnerships including appropriate Community (schools, youth etc) private and public management. Urban Landcare partnerships.</li> </ul>	?	√	√	√
...and are the “green lungs” of Lodz.	<ul style="list-style-type: none"> <li>Air quality monitoring system linked to IUWM monitoring systems</li> <li>Alignment of corridor policy with traffic policy, policy relating to industrial emissions etc.</li> </ul>	x	√	X	√
The application of ecological biotechnologies and in-depth ecological awareness contributes to exceptional quality of life	<ul style="list-style-type: none"> <li>Carefully-targeted environmental awareness campaigns</li> <li>Adult education programmes</li> <li>Education in schools</li> <li>Establishment of and support for urban “landcare” groups, wildlife societies etc.</li> </ul>	?	√	?	√
Our city is a leading centre for innovation, education and implementation in Poland	<ul style="list-style-type: none"> <li>Economic policy (including fiscal incentives) that is aligned with IUWM strategy and vice versa</li> <li>Ensure cross-party support so that long-term policies are created and supported</li> <li>Aim to create a virtuous circle by identifying and supporting early and high-profile successes (“low-hanging fruit” principle)</li> </ul>	x	√	X	√

**Step 5: Evaluate the utility of strategy components against the disaggregated vision under all scenarios.** For each of part of the disaggregated vision, assess whether the linked group of strategy components has the potential to achieve this part of the vision under all the scenarios. Modelling and other analytical techniques can support this process. The result of this analysis, which may take some time, should be a summary table similar Table 3.7.2.

**Step 6: Refine strategy components.** If analysis indicates that groups of strategy components are not able to achieve parts of the vision under all scenarios, try refining the group of strategy components or possibly adding strategies that are linked specifically to achieving the unrealised part of the vision. If this fails, there are two possible courses of action. First, to revise the part of the vision to a form that can be achieved. Second, to proceed in full knowledge that the vision or parts of the vision will not be achieved if some scenarios pan out to be good descriptions of the future. This second “gamblers” option is not recommended.

**Step 7: Combine strategy elements to produce versions of an overall strategy.** By combining different combinations of strategy elements, create a number of overall strategies. Continuously check that these overall strategies have the potential to achieve the vision or revised vision. Particular attention should be given in this step to the financial and other resources that will be needed and whether effective implementation of an overall strategy will necessitate major changes in institutional arrangements and governance systems. Particular attention should also be given to identifying and, where possible, quantifying whether a strategy is pro-poor and at the very least gender neutral. By the end of this step a number of different overall strategies will have been outlined and the relative costs, benefits, merits and tradeoffs of the strategies will have been tabulated.

**Step 8: Select and refine an overall strategy:** Selection of the overall strategy should be based on stakeholder dialogue and, if appropriate, a wider consultative process. During this step, the details of the overall strategy need to be elaborated and particular attention needs to be given to issues related to environmental, institutional and social sustainability and whether life-cycle costs have covered adequately. Finally, particular attention should be given to an integrity assessment aimed at ensuring that the strategy includes measures aimed at ensuring good value for money and minimising the risks of benefits being captured by elites or other social groups.

**Step 9: Start the planning process.** As the planning progress progresses, new people and organisations will become involved sometimes as part of a tendering process. As a result, new ideas may develop and flaws may be identified in the overall strategy. This may result in a requirement for some steps of the strategy development process to be repeated.

### Challenges and tensions

A successful strategy development process builds consensus amongst stakeholders, develops a robust and adaptable strategy and secures the support of politicians, the media and civil society. Although the concept of strategy development based on visioning and scenario building is simple, a number of challenges and tensions often arise when using the technique. These include:

**Lack of information.** In most cases, there is insufficient good-quality information to rigorously assess all the components of an overall strategy. Collecting additional information takes time and money that is rarely available. Use of adaptive management principles can help overcome this problem but even so judgements will still have to be made on the basis of expert opinion. Hence there is often a tension between those who propose more studies and those who want to move ahead quickly.

**Evidence-based decision-making.** Strategy development in the water sector is often based on accepted wisdom, myths or folklore. The challenge in such situations is to encourage stakeholders to put their faith in evidence rather than intuition.

**Internalising external factors.** Regardless of the approach to strategy development, important and uncertain factors outside the immediate control of stakeholders always have a high potential to derail strategies. The challenge is therefore for stakeholders, as part of the overall strategy, to seek to increase their level of influence or control over these factors.

**Spatial and temporal scales.** It is rare for a strategy in the water sector to have no negative tradeoffs at all. Or put another way, any changes in the way water is allocated or managed tends to result in winners and losers particularly if a holistic multi-scalar approach is taken to considering supply and demand. The challenge is to identify and minimise these tradeoffs.

**Acceptable levels of risk.** The methodology described here ensures that risk and uncertainty are considered during the strategy development process. However, this does not mean that the resulting strategies are devoid of risk. Many of the decisions that have to be taken during the strategy development process involve decisions on acceptable levels of risk. These decisions are invariable political in nature and, as such, the challenge is to make sure that a democratic process is followed in reaching decisions.

**Special interest groups.** The method encourages the active involvement of special interest groups, that may be professional bodies, NGOs, or other civil society groups. While it is important that all stakeholders are represented in strategy development it is also important not to allow the process to become dominated by one set of interests.

### The Lodz example

Provisional outputs from the ongoing SWITCH-supported Lodz strategy development process are presented as examples in this briefing note. The vision that was produced by the Lodz learning alliance is presented in Box 3.7.1 and the main elements of the Lodz scenarios are presented in Table 3.7.1. Table 3.7.2 summarises a provisional assessment of strategy components against a disaggregated form of the vision. This indicates that the strategy components as currently listed do not have the potential to achieve the vision or even parts of the vision under the four scenarios. The overall challenge facing the Lodz learning alliance is therefore to identify additional strategy components or to revise the common vision. A particular challenge highlighted by this process is the fact that adoption of IUWM is considered to be an important part of the vision but the macro water governance framework is seen as one of the most important and most uncertain factors external factors over which the learning alliance has no control. This indicates clearly that the Lodz learning alliance cannot produce a robust adaptable strategy that will introduce IUWM successfully to Lodz under all scenarios unless the city increases its influence over or reduces the importance of macro water governance factors.



Box 3.7.2 Tips and tricks

- For assessment of groups of strategy components against parts of the vision to be rigorous, it is important that the vision contains specific numerical targets or acceptable limits for relevant measurable parameters.
- The dividing line between strategy development and planning can be rather fuzzy. It is important in strategy development not to get drawn into the level of detail that is required in planning.
- Simple flexible modelling systems (e.g. Bayesian Networks) can improve the quality of the assessment of strategy components.
- It is usually best to avoid including strategy components in a vision (e.g. the vision is to introduce IUWM by 2038). Ideally, a vision should focus on outcomes and strategy components on achievement of these outcomes. This reduces the risk of circular arguments.
- It is absolutely crucial that some scepticism is used when assessing strategy components. The approach to strategy development described here avoids a “one size fits all” approach that is preferred by many organisations. As such, the initial view taken by assessors should be that strategy components will not work in every technical and societal setting unless proven otherwise.
- Finally, it usually takes some time for potential users to appreciate the relative benefits of the approach described. Resistance to change from more traditional methodologies can be expected.

Acronyms

PCM	Project cycle management
IUWM	Integrated Urban Water Management
RIDA	Resources, Infrastructure, Demand and Access

Related websites and further reading

The EMPOWERS project adapted and evaluated an approach to strategy development based on visioning and scenario building. Guidelines for using this methodology can be found in the Guidelines, Methods and Tools document here: [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120)

# 3.8

Agriculture within the city limits. (Photo credit: Peter Dicampo)

## Innovating in learning alliances: action research concepts and practice

Patrick Moriarty

*Practitioners experimenting together with researchers is the essence of action research. Learning alliances provide a mechanism for involving the stakeholders that ought to use research outputs (the tools, approaches, models and technologies) in all stages of conception, development and testing of these inventions. Planners, engineers, civil society groups, decision-makers and agencies involved in urban water management can help to provide access to information and guide researchers to focus on their problems and take account of their context for uptake of research findings. The objective of this chapter is to demystify action research, and to present it as a straightforward and common sense approach for researchers and practitioners to work together to find solutions to real-world problems.*

### Key concepts

#### Action research

Research carried out by practitioners (undertaking actions) supported by researchers (to analyse and document actions) within 'real world' settings.

#### Action research cycles

An iterative and collaborative approach to problem identification, action planning, implementation, evaluation, and reflection. The insights gained from the initial cycle feed into planning of the second cycle, for which the action plan is modified and the research process repeated.

### Action research: Background and concepts

Action research goes by several names including learning-by-doing and collaborative learning. In essence all these names intend to illustrate two fundamental points. Firstly, it is research carried out by practitioners (undertaking actions) supported by researchers (who help to analyse and document those actions). Secondly, it takes place in the 'real world' as opposed to a laboratory, computer or university (O'Brien, 2001).

In practice, action research can take a range of shapes, sometimes with a stronger academic approach such as the use of modelling to help identify potential courses of action, and sometimes more focused on joint action with a smaller research element. Either way, coordinated and mutually supporting activities between researchers and stakeholders or 'actors' are central.

The aim of action research is to make both 'action' and 'research' more effective in contributing to the overarching aim of supporting innovation. In the case of the SWITCH project, innovation related both to technologies and how water and water-related services are managed in urban areas. Real world problems require real world solutions, which are often difficult to identify or test in academic or scientific settings. For example, demand management may not look too challenging when represented as percentage reductions in water use within models but it can be difficult to realise in practice when the behaviours of consumers need to be influenced. Researchers represent organisations which have conventionally been marginal to much urban water management decision-making. The SWITCH project invited them to take a fresh look at the rules of the game, and become more proactive in engaging with other city actors.

People are more likely to take ownership of and apply new ideas that they have helped to develop themselves. The reality is that the people who read the academic literature tend to be other academics, not policy makers or practitioners. To get policy makers (and managers and engineers) to adopt new ways of thinking means engaging with those stakeholders and helping them to find better ways of doing their work. In this, the scientific method can provide invaluable support in helping to choose between multiple different competing courses of action, as well as in assessing the results of monitoring and analysis and feeding these back into decision making. Some of the origins of action research are sketched in Box 3.8.1.

**Box 3.8.1 Where does action research come from?**

- The roots of action research can be traced to many different places. Certainly a strong element comes from social science research. Taken at its most extreme this social constructivist approach supposes that all 'truth' is a social construct – and therefore the effort of science to be 'objective' is bound to fail. The researcher is inextricably linked to, and therefore interacts with, the 'system' they wish to study.
- More pragmatically, many experiences of action research come from areas such as agricultural research and extension and education, where there is a strong political and social element that must be taken into account if one is to understand how a given intervention is to work.
- In this pragmatic guise, action research is also closely related to adaptive management (itself rooted in ecological concepts and thinking) and implies a change in how managers (and other stakeholders) within complex systems act and relate to each other and the system itself. The essence of adaptive management is that complex systems are too complex for it ever to be possible to analyse them fully, and hence rational decision making approaches (such as optimisation) are bound to fail. The only way to make progress is to adopt a process of constant action followed by adaptation in the face of system reaction.

**Box 3.8.2 Some lessons from the EMPOWERS project**

- Action research is implemented in different ways in each country, with team members from widely differing institutions.
- Stakeholder involvement is essential, but it is unrealistic to expect all stakeholders to engage to the same degree all the time. Complex issues of individual versus institutional interests mean that different members play differing roles over time.
- Because action research implies change, there will be institutional and individual drivers of change and also institutional and individual resisters to innovation and change. It is essential to have at least one champion among key stakeholders – someone who believes in the overall vision of the process, and has the conviction and negotiation skills to carry less convinced stakeholders with the process and to overcome or neutralise those who are actively hostile.
- Depending upon the nature of the society, one of the most difficult and challenging aspects is for experts to learn to say 'I don't know'. The experienced technical and project management staff in EMPOWERS initially found it very difficult to lead stakeholders in a process where the end-vision was clear but the path to it was not. They were worried that being seen to be unsure would lead to a loss of faith by other stakeholders and in failure.
- Action research is often expensive. While more conventional research can often be done relatively cheaply – using snapshot surveys *etc.* – the need to engage fully within a lengthy process calls for skilled people, who typically cost a lot. Additional costs are also implied by the need to build in space for reflection (during which people are not 'working,' but often taking part in meetings and workshops) and for documentation which can be expensive and again calls for specialised skills.

**How to do action research – the action research process**

There are no blueprints for action research. It is more of a philosophy – a way about thinking about the relationship between research, action and impact – than a hard-and-fast set of activities.

There are a number of conditions however, for an action research approach to be appropriate:

- Perhaps the single most important element required for action research to succeed is a desire for change or improvement among at least some stakeholders. Openness to new ideas is required by all parties, who must be willing to challenge themselves and to try things in different ways. When people realise that 'business as usual' is not working, the space to try new approaches is created. Only when the desire for change is strong and personally motivated will resistance to change be overcome.
- It follows, that a willingness to be wrong – and to be seen to be wrong – is essential. Without a willingness to take risks and make mistakes there can be no progress. The danger of action research is that action orientated people become nervous

in the spotlight of research interest that they will be ‘proved’ to be wrong or ineffective. Equally, researchers faced with the responsibility of actually having real-world action and expense based on their ideas may become overcome with an unfamiliar shyness.

- For people in a position of leadership – senior managers, engineers, researchers, politicians – a willingness to admit that they don’t know the answer can also pose problems. Standing up in front of a group of peers, seniors and juniors and saying, “We have a problem, I’m not sure about the solution, but if we work together we may be able to find one” takes courage and leadership. On the one hand, action research is a very simple concept: actors working together with researchers. On the other hand, practical application is complex, calling for experience and a certain way of looking at the world, best described as a mix of flexibility and rigour.

### The action research cycle

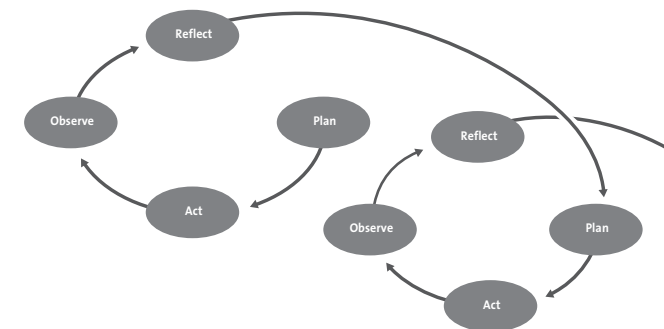
Having said that there is no blueprint for action research, some typical steps or elements can nevertheless be identified. These are often represented as a cycle. In Figure 3.8.1 the action research cycle is shown as having four main steps, although some of these can be sub-divided and in some models there can be up to six components (see the examples cited in O’ Brien, 1998). However, action research should not be approached in an inflexible manner and the four steps presented here illustrate the main components and concepts.

- **Plan:** Based on analysis of the situation, stakeholders identify a vision or objectives for their work. Based on these objectives, they identify and prioritise actions and plans to implement as part of their research. The terms ‘vision’ and ‘objectives’ are used here rather than the more common ‘problems’ because a purely problem-based approach can narrow the options. A more positive ‘vision’ based approach to analysis can offer a more useful starting point.
- **Act:** Stakeholders implement actions that were identified and prioritised during the planning step. The quality of implementation is very important. The subject of the research is the usefulness of the chosen actions and for that to be a fair test, they must be done well. Poorly implemented actions can lead to negative results that have little to do with the validity of the underlying approach but can nevertheless cause stakeholders to believe that the chosen course of action has been a failure.
- **Observe:** Stakeholders observe the impacts of their activities based on monitoring and analysis. The support of researchers and the quality of the research methods is critical here. Researchers need to provide a rigorous framework for measuring the impact of the action, as well as its costs. They must advise stakeholders how far they can attribute the observed results to the action they have taken, and how much the results might be due to external events. Stakeholders will want to know whether the results are as expected. If not, why not?
- **Reflect:** Stakeholders reassess their objectives in the light of observations, and re-formulate plans for the next phase.

Ideally there should be more than one full cycle within an action research process allowing for several steps of planning, implementation, observation, reflection and refinement.

Periods for reflection (typically linked to workshops or meetings) should take place on a regular basis, perhaps every few months. The danger of lengthening the cycle without frequent reflection is that those involved become locked into the ‘action’ part of their work and forget about the research. Taking time-out from the action is itself a powerful tool for learning. Ensuring that reflection is not neglected may mean breaking a larger process down into a number of sub-processes.

Figure 3.8.1 Cycles in action research after Kemmis and McTaggart (1988)



### Key elements of action research

A number of elements are particularly important in implementing action research. These include:

- **Clarity of visions/objectives.** It is essential that the group undertaking action research is reasonably clear about its objectives. This does not mean that a learning alliance has to be clear from the outset about how to achieve the vision or objectives. That is what the research is about. However, they do have to be clear what issue needs to be addressed and what vision to be achieved. Establishing this baseline is an important part of reflecting and planning.
- **Clarity of baseline, and indicators of change.** It is also important to be clear about the baseline for the significant indicators where change is being planned. What are the elements of the system that action research intends to change? What important intervening factors may also exist? What external factors (externalities) may either have an impact upon, or be impacted on, by the activities being researched? Identifying and monitoring these indicators is essential for successful observation as it allows change to be measured. If you don’t know where you started, you cannot measure how far you get.
- **Documentation and frequent dissemination.** The objective is that research informs action and the results of action feeds back into research. These processes can fail if there is poor communication of results and findings to stakeholders (within and outside the alliance). Documentation (see guideline 3.10) helps project staff and stakeholders to track meaningful events to discern what is happening, how it is happening and why it may be happening. It highlights issues that need action and is therefore a link between action and research. An important difference between action research and conventional research is that documentation is not something that happens afterwards, but is a tool of the project itself and is used between communicate with project members.

**Box 3.8.3 Some practical considerations on action research modalities**

- Action research is participative, but the extent of participation may vary. In some instances there may be a genuine partnership between researcher and others. The distinction between researcher and others may disappear. The researcher may choose to maintain a separate role, for example that of informant.
- Models for collaboration will also vary. In some cases, stakeholders may be seconded and housed within local government offices or their own institutes. Formal agreements on the use of data may be required.
- It is important to have tangible incentives for collaboration. For researchers it may be access to data, receiving feedback and guidance on key issues relating to potential for uptake of the innovation. For stakeholders it may be perceived cost-saving benefits of the innovation.
- Learning alliance members sometimes struggle to justify the time spent on the learning alliance process and on specific research. Institutional support is an important factor in improving continuity of involvement and follow-up.

Within SWITCH the process of developing the City Water modelling tool (Box 3.8.4) illustrates some of the challenges of joint research and planning.

**Box 3.8.4 Developing the 'City Water' tool in Birmingham**

SWITCH developed a suite of models for use by city planners and other stakeholders under the umbrella name of "City Water". The University of Birmingham has been working on the City Water Balance module of this software which assesses water, energy and quality balances within a city. The learning alliance in Birmingham provided a mechanism for involving planners and other agencies with the data that researchers needed. They had struggled for some time to get access to the right data. A confidentiality agreement was required as part of gaining access to data, underlining the need to have clear safeguards as well as incentives in place to support collaborative research. Sharing of data happened because stakeholders came to see the potential value of the model and this underlines the need for researchers to be proactive in promoting their products to other stakeholders. However, understanding incentives and the institutional context for uptake is not something that is often pondered or taught to researchers.

## Summary

Action research is conceptually simple but in practice is very challenging, both personally and managerially, particularly for those initiating and facilitating the process. For researchers, it means abandoning the safety of playing the objective outside observer and accepting being an actor within a process. For practioners, it means opening your way of working to the penetrating stare of outsiders. For all, it means embarking on a journey whose path is far from clear and by its nature not guaranteed of success. But many of those who have taken the step do not look back, because there is a real chance of getting inventions into widespread use to solve key problems. And that motivates everyone.

### References

Kemmis, S. & McTaggart, R. eds., 1988. *The action research planner* (3rd edition). Deakin University: Victoria.

O' Brien, R., 2001. Um exame da abordagem metodológica da pesquisa ação (An Overview of the Methodological Approach of Action Research). In: Richardson, R. ed., 200? *Teoria e Prática da Pesquisa Ação* (Theory and Practice of Action Research). Universidade Federal da Paraíba: João Pessoa, Brazil. [Online] (English version) Available at: <http://www.web.ca/~robrien/papers/arfinal.html> [Accessed 20 March 2011].

This guideline is based in large part on O' Brien's excellent summary.

### Further reading

Ballard, D., 2005. Using learning processes to promote change for sustainable development. *Action Research*, 3, pp. 135-156.

Kolb, D., 1984. *Experiential learning: Experience as the source of learning and development* Prentice-Hall: Englewood Cliffs, New Jersey.

Moriarty, P. et al., 2007. *The EMPOWERS approach to water governance: guidelines, methods and tools*. Inter-Islamic Network on Water Resources Development and Management, INWRDAM: Amman, Jordan. [Online] Available at: <http://www.project.empowers.info/page/3344> [Accessed 20 March 2011].

Smith, M. K., 1996, 2001, 2007. Action research. *The encyclopedia of informal education*. [Online] Available at: [www.infed.org/research/b-actres.htm](http://www.infed.org/research/b-actres.htm) [Accessed 29 December 2010].

Stringer, E. T., 2007. *Action Research: A handbook for practitioners* (3rd edition). Sage: Newbury Park, California.

Winter, R., 1989. *Learning from experience. Principles and practice in action research*. Falmer Press: Lewes.

### Related websites

The following websites provide further practical resources and examples:

ALARA: the Action Learning and Action Research Association: <http://www.alara.net.au/public/home> [Accessed December 29 2010].

The Action Research Resources website provides links and includes several well-known action researchers speaking about why they choose to do action research: <http://www.scu.edu.au/schools/gcm/ar/arhome.html> [Accessed December 29 2010].

The EMPOWERS project website: [www.project.empowers.info/page/120](http://www.project.empowers.info/page/120) [Accessed December 29 2010].

Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) framework developed by the University of Wageningen, The Netherlands, as a "participatory action research methodology": <http://portals.wi.wur.nl/ppme/?RAAKS> [Accessed December 29 2010].

*It would be complacent to assume that our actions in urban water management will always lead to social benefits. In fact, where social issues are poorly understood or considered, and in contexts where governance is not strongly socially-inclusive, urban water management ‘improvements’ are likely to do social harm. Research and other activities in urban water management need to be designed to be socially inclusive. This chapter explains the concept of social inclusion and its implications for project design and implementation.*

## Key concepts

<i>Social exclusion</i>	The “process by which certain groups are systematically disadvantaged because they are discriminated against on the basis of their ethnicity, race, religion, sexual orientation, caste, descent, gender, age, disability, HIV status, migrant status or where they live” (DFID, 2005).
<i>Social inclusion</i>	the state of being included in a community and society (Beall, 2002).

## Introduction

“We can no longer continue to do business as usual. In the past this has resulted in unacceptable levels of social exclusion and deprivation. Heart-rending testimonials of homelessness, of forced evictions, and of deprivation of the right to the city serve as a stark reminder of the human and social cost of disenfranchisement” (UN-Habitat, 2010).

Urban water management policies, processes and practices are always likely to impact strongly on social issues. They deal with access to basic services – water and sanitation – that are fundamental rights and key to poverty and the standard of living. Where access to these services is not universal, usually it is the poor that receive the worst quality service or pay the most (and often both). Urban water management also involves major infrastructure developments and large-scale environmental engineering. Sewerage treatment plants, flood management works, and urban river restoration may displace communities – and frequently in the developing world the poorer communities live vulnerably near urban watercourses – and significantly change habitats for better or worse for local residents. Urban water management also creates employment opportunities,

# 3.9

## Promoting equity in processes

Valerie Nelson, Adrienne Martin and Deirdre Casella

Lavender Hill in Accra, Ghana: Emptying tankers full of waste from septic tanks. (Photo credit: Peter Dicampo)

including potentially important opportunities for local communities and residents as well as professionals and experts. Whether urban water management actions contribute to social inclusion of the poor, of women, of ethnic groups and other marginalised communities, or result in exclusion will hinge on design and details of implementation.

What is social inclusion?

Social inclusion describes the state of being included in a community and society as a whole. It is a condition in which individuals and groups can access the range of available opportunities, services and resources and contribute to planning and decision making. It also refers to the actions and processes needed to transform the situation of those who are socially excluded, by influencing institutions and changing the perceptions that create and sustain exclusion (Beall, 2002).

Dimensions of social exclusion

Social exclusion is the result of different kinds of discrimination which disadvantage certain social groups, preventing them from escaping poverty and undermining their well-being. There are at least three dimensions of social exclusion. People can be excluded because of: a) what they have or do not have in terms of access to resources (a lack of resources can be termed economic deprivation); where they live (spatial deprivation occurs when stigma or a bad reputation of a specific neighbourhood acts as a barrier to creating social contacts or finding a job etc); or simply because of who they are (discrimination flowing from specific group identities as perceived by others in society).

Table 3.9.2 Dimensions of social exclusion

What you have	Discrimination because of limited access to material resources, such as quality of housing, connectivity to water and sanitation services, ability to purchase available services, assets which enable you to derive benefits from the available services.
Where you live	Discrimination resulting from characteristics of a location. Remoteness in rural areas and physical obstacles prevent participation in public life; urban neighbourhoods can be separated from adjacent areas by violent sub-culture and squalor, preventing participants from getting work or accessing services. Residents suffer stigma from living in the 'wrong part of town'. Internal and international migrants may also lack access to welfare and public services as they are in the 'wrong place' and not recognised as having rights to those services. "Squatter" settlements are typically disadvantaged in terms of access to water and sanitation services. The trend towards 'gated' areas where better off people are protected itself contributes to a divided culture where some are excluded.
Who you are	<p>Processes of exclusion occur when certain groups are regarded by the more powerful in society as being of lesser worth. This is expressed through beliefs, values, attitudes and behaviour which disparage, stigmatise, stereotype, make invisible and discriminate', often using socially accepted references to religion or tradition, or by evoking fears of 'the other', or of 'the unknown'.</p> <p>Identity-based social exclusion affects groups of people who are defined by their distinct cultural practices and shared way of life (e.g. group identities based on caste, ethnicity and religion) and thus form distinct or 'bounded' groups. It can also affect individuals, or 'unbounded' categories who are defined by a single shared characteristic (e.g. gender, disability or HIV-positive status). Members of such categories may share very little in common, aside from the discrimination they face. The resulting cultural devaluation undermines the confidence and capacity for action of those in question and can sometimes have serious effects in terms of poverty.</p>
Time issues	Exclusionary processes and outcomes can persist or alter over time, e.g. through the transfer of poverty from one generation to the next; the cumulative effect of multiple stresses (e.g. drought, malaria, HIV/AIDS, unemployment, reduction of state provision of services etc) on the livelihoods of excluded groups; the time-related exclusion experienced by migrants, or sudden changes, such as illness, which can swiftly lead to a change in position for an individual.

Source: adapted from Kabeer, 2005.

Disadvantage has multiple sources and manifestations, which can overlap at any one point in time, affecting the life chances of individuals and social groups. People can be excluded from different things simultaneously; such as employment, earnings, livelihood opportunities, property, housing, minimum consumption levels, education, the welfare state, citizenship, personal contacts and respect (Silver, 1994).

The different types of social exclusion can interact and reinforce each other. For example, social exclusion based on identity can restrict access to economic and livelihood opportunities. It can also limit access to better housing, social services and other resources and prevent participation in political life (e.g. the right to organise, protest or vote etc). Gender is an important factor influencing discrimination and access to resources (CAP-NET, GWA 2006), but other factors, such as ethnicity, caste or religion, may be relatively more important in some situations. Gender discrimination often combines with these other forms of discrimination.

Such patterns of disadvantage, while exhibiting some changes over time, can also be very persistent, especially where social prejudices are deep-seated and embedded in social institutions. In these circumstances, individuals find it difficult to escape poverty and the effects of stigma, because discrimination can lead to the transfer of poverty across generations. In these circumstances, perpetuating social exclusion does not require any overt discriminatory action. Unless positive efforts are made to draw excluded groups into participatory processes, they will remain excluded.

### Understanding social exclusion

The notion of social exclusion has become more important in recent years, because of a change in thinking about poverty and wellbeing. Beyond narrow measurements of poverty based on income, more sophisticated understandings of well-being have emerged – focusing not only on access to material goods, but also on access to social networks, political representation, good health, and a clean environment for example. This understanding of disadvantage broadens the idea of deprivation from one of economic disadvantage to include social and political deprivation - the suffering people can experience because they cannot fully participate in social and political life. The ways in which people gain access to resources or face barriers to obtaining basic rights and livelihood resources is being given greater attention as the role of agency, power and identity become more central to analyses of development processes.

Social exclusion and poverty are not necessarily the same. Some poorer groups have strong social networks and mechanisms for functioning in cities and urban areas. Some better off groups may face discrimination, perhaps on grounds of ethnicity. However, more frequently, poverty is a contributing factor to social marginalisation and socially excluded groups may become impoverished as a result of discrimination and lack of access to opportunities. Even if an economy grows, the socially excluded may not be able to escape poverty (DFID, 2005). They may be forced to participate on unequal terms, for example in labour markets which exploit their relative powerlessness and reinforce their disadvantage (Hickey and Du Toit, 2007). Tackling social exclusion can help development initiatives to achieve more equitable and sustainable impacts, but failing to address social exclusion can lead to outcomes that exacerbate poverty by further marginalizing the already disadvantaged.

#### Box 3.9.1 Social exclusion in Accra, Ghana

A review of exclusion mechanisms in Accra pointed to exclusion related to regulations of the water authority, technology choice and financing options and emphasised the importance of involving representatives of marginalised groups from the start of an intervention:

- regulations of the water authority: Ghana Water only considers people with connections to be their clients
- technology choice: focus on water-borne sewerage means an emphasis on high and middle income areas
- financing: block tariffs makes water more expensive in compound housing and families lack capital to invest in water storage or connection
- status of poor settlements: lack of land tenure and limited social and political capital
- cartels between water vendors and local (political) leaders
- parallel power structures of local chiefs
- gender: women cannot inherit property.

Exclusion can operate through formal and informal institutions and in intentional and unintentional ways. Both formal and informal institutions can reflect the prejudices, beliefs and attitudes that prevail in society. Exclusion can be openly embedded in public policy, such as laws that prevent women from inheriting land or property. In informal social institutions, such as the household, exclusion may be subtle. In the public sphere, ethnic minorities can be excluded from social life by language barriers (DFID, 2005). Investment choices can either increase or decrease the divide. Most government financed WASH investment goes into capital investments in urban water and sanitation systems that predominantly serve the emerging middle-class with household connections.



**Box 3.9.2 Inclusive approaches in SWITCH cities**

- SWITCH focused on social inclusion to the extent that it could, to improve the extent to which participatory processes facilitated by learning alliances were inclusive in nature and that issues of social exclusion were taken into account. In some cases (representatives of) socially disadvantaged people participated in decisions relating to the use, access and management of water. A briefing note was prepared, several training sessions were held and specific case studies were undertaken to build an understanding of social inclusion issues, and to inform decision making processes in the project. However, the awareness and practical steps towards creating opportunities and space for participation of the socially excluded remained limited in most cities.
- In Lima, in an arid and low income part of the city the OGAPU eco-productive park tested and demonstrated productive re-use of wastewater. Local community members were involved in a local learning alliance, which was formed for joint planning and learning on this specific demonstration project.
- In Belo Horizonte, the SWITCH team worked closely with schools located within poor communities, and tried to engage the wider public through activities in public spaces such as parks. Training was also provided to the representatives of slum and low-income communities that were engaged in the participatory budgeting processes to support better project design and technology choice in river restoration.
- In Accra, a case study on water supply in two low-income communities in Kumasi, the second largest city in Ghana provided empirical data on the nature of water services to the urban poor (Nyarko *et al.*, 2006). It recommended creating incentives for the formal utilities to serve the urban poor, reviewing the tariff structure and strengthening accountability mechanisms. A desk-review of policies, legal and regulatory framework for water supply complemented the case study. The information was shared in the Accra learning alliance and helped identify opportunities for optimising social inclusion in Ghana's urban water supply delivery.
- In Alexandria the learning alliance chose a demonstration site in one of the informal settlements within the city. This site has a community-managed sanitation system that is poorly designed and semi-functional. Social inclusion researchers worked with the community to identify sanitation and demand management options that would be appropriate for conditions in the slum area.
- In Hamburg, the project team worked to engage minority groups on the island of Wilhelmsburg through organisations representing ethnic minority groups focusing on education, employment, social welfare and housing, rather than on urban water issues.

## What implications should tackling social exclusion have for project design?

Moving from analysis towards engaging disadvantaged groups and confronting prejudice and discriminatory beliefs is not a straightforward task. It requires resources, facilitation skills and commitment to tackle exclusion in an integrated and coordinated fashion. Piecemeal efforts are unlikely to be successful in securing the necessary social changes required.

Challenging vested interests and the status quo can lead to disputes and conflict. Efforts are required to try and foresee where these might occur (through skilled analysis of stakeholder positions and interests) and for support to be provided for mediation and negotiation as necessary, particularly for vulnerable groups. It is clear from gender mainstreaming efforts to date, that an integrated approach is required, but also an explicit recognition of the essentially political nature of social change in development processes – otherwise solutions will be superficial and bureaucratic, rather than transformational. In plain language this means that ensuring that organisations include women amongst their delegates to meetings is not enough if those women are not helped to express their interests and views. It is also possible, that in a bureaucratic manner, including excluded groups can in practice mean that some marginalised groups will be made to conform to the dominant culture of the process, included physically but not with their own voice. They can, in effect, be integrated against their will.

Finally, a key question remains as to what exactly it is that people are being included in, on whose terms and in whose interests (Beall, 2002)? The idea of inclusion in society goes to the heart of debates about the appropriate role of the state and the very different development pathways that exist at a macro-economic, national level. It is possible that a focus on inclusion as the response to exclusion has encouraged limited, reformist policy agendas, rather than more radical, transformational ones (Beall, 2002).

The terms of inclusion are very important because of the considerable barriers to participation of the most socially excluded. Among these are constraints on their time and mobility, their lack of assets, apathy and disillusionment arising from past failed initiatives and lack of confidence to voice their needs and opinions. These factors can lead to such groups being left out of decision-making processes. Ensuring the participation of the most deprived can be difficult because powerlessness can undermine people's self-confidence and aspirations and their ability to challenge exclusion' (DFID, 2005) and assistance is needed to support their empowerment.

In relation to participatory processes, it is important that excluded groups are able to influence the research and planning agendas, and are not merely limited to contributing to decisions with narrowly defined parameters. This happens for example, if an inner circle produces two or three options for a scheme, and then the groups that were excluded from devising and planning the options, get some limited choice over which of the options is implemented.

**Box 3.9.3 'Tips and tricks' to address social exclusion in project processes**

- Communities are heterogeneous and differences in the community need to be taken into account. Stakeholder analysis can help understand the different subgroups and their relations as well as interests, possible conflicts, formal and informal representation.
- Organize meetings and events at a time and place that is suitable for men as well as women, if all people cannot be heard at the same time, ensure there are meetings at different times and ensure that outcomes of sub-meetings are shared.
- Keep in mind the target audience and adapt your language: avoid jargon and use vernacular language to better enable everyone to participate in the discussion.
- In process of design and decisionmaking consider the opinions, needs and ability of consumers to pay for and maintain services.

## Summary

The achievement of sustainable technical and institutional solutions is unlikely unless social inclusion and exclusion issues are addressed. Sustainability is not only about environmental sustainability, but about social equity and human rights. Understanding how exclusion and cultural devaluation works is not always easy, even identifying how and where it occurs in one's own culture can be problematic. Prejudices can be widespread, persistent and widely accepted, and thus appear 'given' or 'natural', even though they are in fact socially constructed. Sometimes, challenging vested interests and the status quo can lead to disputes and conflict.

Moving from analysis towards engaging disadvantaged groups and confronting prejudice and discriminatory beliefs is also not a straightforward task. It requires resources, facilitation skills and commitment to tackle exclusion in an integrated and coordinated fashion. SWITCH promoted a participatory, multi-stakeholder approach through the city learning alliances. However, it is hardly surprising that not all stakeholder participation processes manage to ensure that less vocal, less powerful groups gain an equal voice in discussions and decision-making. To say otherwise would suggest that a single project, however, well intentioned, could negate the imbalances that exist in society.

Planning and policy-making processes do not represent level playing fields: some groups are more included than others. One of the key challenges at the heart of sustainable and equitable development is to find ways to level this playing field and help excluded groups to have greater voice and negotiating power in decision making: for the benefit of the whole society.

### References

- Beall, J., 2002. *Globalisation and social exclusion in cities: Framing the debate with lessons from Africa and Asia* (Working Paper Series 02-27). Development Studies Institute, London School of Economics and Political Science: London, United Kingdom.
- CAP-NET & GWA, 2006. *Why gender matters: A tutorial for water managers*. [Multimedia CD and booklet]. CAP-NET International network for Capacity Building in Integrated Water Resources Management: Delft, the Netherlands.
- Department for International Development (DFID), 2005. *Reducing poverty by tackling social exclusion* (Policy paper). DFID: London, United Kingdom.
- Hickey, S. & du Toit, A., 2007. *Adverse incorporation, social exclusion and chronic poverty* (Working Paper 81). IDPM/Chronic Poverty Research Centre (CPRC): Manchester, United Kingdom.
- Kabeer, N., 2005. *Social Exclusion: Concepts, Findings and Implications for the MDGs* (Paper commissioned as background for the Social Exclusion Policy Paper). Department for International Development: London, United Kingdom. [Online] Available at: <http://www.gsdrc.org/docs/open/SE2.pdf> [Accessed 24 September 2010].
- Nyarko, K. B., Odai, S. N. & Fosuhene, K. B., 2006. *Optimising social inclusion in urban water supply in Ghana*. [Online] Available at: [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/CACC\\_PAP\\_Optimising\\_social\\_inclusion\\_in\\_urban\\_water\\_supply.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/CACC_PAP_Optimising_social_inclusion_in_urban_water_supply.pdf) [Accessed 9 May 2011].
- Silver, H., 1994. Social exclusion and social solidarity: Three paradigms. *International Labour Review*, 133 (5/6), pp. 531-578.
- UN-Habitat, 2010. *The right to the city: bridging the urban divide*. In: The fifth session of the World Urban Forum 22-26 Mar 2010, Rio de Janeiro, Brazil. [Online] Available at: <http://www.unhabitat.org> [Accessed 4 May 2011].

### Further reading

- Allen, A., Davila, J.D. & Hofmann, P., 2006. Governance of water and sanitation services for the peri-urban poor. A framework for understanding and action in metropolitan regions. The Development Planning Unit, University College London: London, United Kingdom.
- UN-Habitat, 2009. Urban World: Bridging the urban divide. Why cities must build equality, December 2009-January 2010, 1(5). [Online] Available at: <http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2880> [Accessed 9 May 2011].



# 3.10

This urban garden was irrigated using only mains water until a roof water harvesting system was constructed, Belo Horizonte, Brazil. (Photo credit: John Butterworth)

## Process documentation

Ton Schouten and Carmen da Silva Wells

*Projects tend to look at stumbling blocks and barriers along the way as inconveniences that they need to quickly overcome, rather than opportunities to learn from that can increase the impact of the project. Documenting the realities of a project and of change processes can contribute to learning and lead to intervention adjustments for better results. Process documentation is a valuable tool in action research and learning alliances because it can trigger reflection and debate on what worked, and on what did not work, on blockages along the way and how were they overcome. It can also provide insights into how factors such as historical context, politics and stakeholder relations, or people's beliefs and attitudes impact on the course and outcomes of an intervention.*

### Key concepts

<i>Process documentation</i>	A tool that helps project staff and stakeholders track meaningful events in their project, discern more accurately what is happening, how it is happening and why it is happening.
<i>Theory of change</i>	All projects have a theory of how the steps and methods applied will lead to outcomes. Most of these theories are implicit, but some projects, in particular those with the aim of social change, make the theories explicit, which allows stakeholders to discuss basic project assumptions.

### Introduction to process documentation

Change cannot be fully anticipated or planned, especially during interventions that target complex processes such as sector integration or improved governance. Process documentation acts as the project record or memory so that events remain clear in retrospect. It is done to help those involved learn from the curves and the bumps on the project road – what happened, how and why did it happen? Documenting gradual changes in stakeholders' perceptions or involvement, the stumbling blocks, unintended changes and insights on what works and what doesn't work, can help to promote greater learning

within the project team and with a wider group of stakeholders. Documenting and reflection during the process, instead of only at the end of the intervention, increases the ability of the team to use the lessons learned and adjust the intervention strategy.

## What is process documentation?

Increasing attention is being given to documentation, joint learning and reflection in development projects. Tools such as ‘most significant change’ (Davies and Dart 2005), case studies, process monitoring (GTZ 1996) and participatory video are efforts to make the development process visible and learn from it. In the water sanitation and hygiene (WASH) sector, process documentation is a relatively new term for a documentation and learning approach for interventions with some guiding principles and an associated set of tools. We document against a certain programme logic or ‘theory of change’, which represents the underlying ideas about how change is expected to take place in a given initiative. We try to capture the unexpected factors that seem to affect the change process that it is aimed at. The approach consists of a set of general ideas and tools to collect, document, analyse and communicate developments in a project or intervention against its ‘theory of change’. Box 3.10.1 presents a working definition of process documentation.

### Box 3.10.1 Working definition of process documentation

‘Process documentation is a tool that helps project staff and stakeholders to track meaningful events in their project, to discern more accurately what is happening, how it is happening and why it is happening’. (Schouten *et al.*, 2007)

Process documentation is about capturing a change process and organising, analysing and disseminating the findings. As any activity, process documentation must be planned and resourced.

The main elements are:

1. Capturing the change process related to a specific project – activities, interactions between stakeholders, issues, contextual factors, unexpected developments.
2. Organising the information in such a way that stakeholders have an opportunity to reflect and learn about the process.
3. Analysing information by looking at common themes, trends and patterns and placing the findings in the context of the project and the project’s theory of change.
4. Disseminating the information quickly enough to be most useful.

### Box 3.10.2 Process documentation in SWITCH

Regular documentation of activities and events relating to SWITCH activities and the city learning alliances was undertaken by learning alliance facilitators themselves and made available in print and through the city websites. Process documentation training was provided in the second year of the SWITCH project, but was not initially budgeted or planned for.

In addition, structured reflection with the help of ‘outsiders’ was done twice during the project (in 2008 and 2010). This facilitated progress analysis was referred to as ‘city assessments’ and undertaken by the city project teams (city coordinators, learning alliance facilitators, locally based researchers and partners) with support of peer reviewers from other consortium members or working in another SWITCH city. The city assessments were useful for helping city stakeholders and the SWITCH teams to take a step back and reflect on change in their city. While the focus was on the project, reflection also included issues of context: the existing patterns of communication and collaboration and how these were changing or what challenges they presented for achieving SWITCH objectives. The city stories in the first part of this book are based on these assessments.

## Why do it?

Process documentation is often done informally by individuals reflecting on successes and stumbling blocks in a project, but if it is built into the project design and documented, it can help to reach the project goals. Process documentation happens when project staff and stakeholders carefully track and reflect on the context of change, successes and challenges. This helps projects to be smarter, but also provides the outputs to engage a wider group of stakeholders in the debate about important development processes such as the delivery of water and sanitation services. Process documentation is therefore valuable for action research and multi-stakeholder platforms.

There are several reasons for systematically observing, documenting and analysing change processes in an intervention: To improve the quality and impact, to test assumptions and theories, to portray the local context and local stakeholders, to add a valuable element to the work of a project team. Process documentation has been applied in a range of programmes and projects in various ways by IRC and partners: as an activity to increase learning and dialogue, as an input to communication materials and as a monitoring method. The main focus has shifted from broad documentation objectives to approaches more focused on providing information and story telling for monitoring, communication and public relations products. (Da Silva Wells *et al.*, forthcoming).

## What to document?

A range of activities, interactions between stakeholders, issues, contextual factors, unexpected developments can be documented. Therefore, a clear focus for documentation will be helpful. In developing a process documentation plan, events, people and places to track are considered. These will relate to the 'theory of change' of the project, but also to the expected project course. Some issues beyond the project boundaries may be relevant for how the project unfolds and should be documented as well.

Project teams can anticipate where project objectives may cause tension or friction with existing traditions, attitudes and power constellations. These are the encounters the process documentation specialist has to track. It is useful to also look beyond time and space boundaries of a project. What is the history of the structures, beliefs, attitudes and ways of working? How do this impact on the project? Box 3.10.2 describes how attitudes of the consortium members regarding the learning alliances were documented. During the course of the project, these attitudes changed as the alliances and project interventions evolved and people became more engaged.

## How to do it?

Process documentation needs to be planned. The most important steps in planning process documentation are highlighted briefly below.

1. Discuss and identify the purpose of process documentation. Is the main purpose learning within the project team and/or with direct stakeholders or is the focus mainly on external communication.
2. What is the theory of change of the project and how will the indicators derived from the theory help process documentation to focus on key elements?
3. What tools are needed to capture the process, organise the information, analyse the findings and disseminate the information?
4. Who will document what? Do skills need to be developed in writing, video, photography, editing, and website development?
5. What will the outputs be? For each output a short synopsis should be written indicating the content, target groups and objectives it serves.
6. How and when will process documentation be monitored?

In SWITCH systematic reflection and documentation at the city level was combined with periodic semi-structured interviews at the level of the research consortium. A briefing note was produced and process documentation training was provided on story writing, the use of photo stories and the use of film. During this hands-on training, three specialists on process documentation from the EMPOWERS project shared their experience.

### **Box 3.10.3 Training products attracted new stakeholders**

The training course on process documentation was provided in Lodz, Poland, and resulted in several outputs that were used by the Lodz SWITCH team to engage alliance members and city stakeholders.

The writing group produced an 8-page supplement with the national newspaper Gazeta Wyborcza, showing how the SWITCH project was trying to promote learning and change for better water management in the city of Łódź.

A photography exhibition was put together by course participants, working in the National Film, Television and Theatre School in Łódź. Photos explored how peoples' lives in Lodz relate to public spaces and water. The exhibition was designed to show how rehabilitation and restoration projects around water could be more socially inclusive.

A short film Sokolowka River Back to Life tells the story of how the city of Łódź was trying to restore an urban river.

### **Box 3.10.4 SWITCH City Assessments**

The methodology used for SWITCH city assessments was a combination of desk research (review of relevant documents), interviews and focus group discussions with team and city stakeholders, and reflection with city team members for joint analysis and formulation of recommendations.

Several factors were of importance in making this a success. Human resources—mainly people with writing skills and a bit of distance from the daily 'project mode', the ability to be critical, but also diplomatic and to listen carefully and provide constructive inputs and time. In addition there was a clearly defined output and a prepared template to work from. Assessment teams spent an average of 5 days on interviews and discussions in the cities as well as 5 days to arrange interviews, read background materials, write papers and address revisions. There was a specific budget for peer reviewers to travel to the cities and assessors attended a one-day training workshop before they travelled.

The assessments were seen as a key step in documenting city experiences in SWITCH cities, and useful for helping the city teams to identify ways to scale up and sustain impacts, and assess opportunities.

Tools

Tools are needed to help project staff to put process documentation into practice. The semi-structured interview has been most widely used to document changes in how researchers involved in SWITCH perceive their learning alliances. Tools can be linked to different aspects of process documentation, as presented in table 3.10.1 and further explained in the following paragraphs.

Table 3.10.1 Aspects of process documentation and related tools

Aspects of process documentation	Tools for process documentation
Capturing the process	<ul style="list-style-type: none"><li>• interviews</li><li>• focus group discussions</li><li>• observation of (formal and informal) meetings</li><li>• documentation of anecdotes, jokes and stories that reveal certain stereotypes or attitudes</li><li>• diaries of project team members and/or stakeholders</li><li>• photography and video</li><li>• storytelling such as ‘writeshops’ and ‘most significant change’</li></ul>
Organising the information	<ul style="list-style-type: none"><li>• Filing: simple filing guidance framework/formats</li><li>• Compiling: articles, photo books, video bites and films, case studies, columns, written portraits, short memos, a diary, murals, photo briefs and video bites</li></ul>
Analysing the findings	<ul style="list-style-type: none"><li>• Reflection workshops and meetings with different stakeholders at various intervals, corresponding with planning cycle and resources available</li><li>• Writeshops</li><li>• ‘Most significant change’</li></ul>
Disseminating the information	<ul style="list-style-type: none"><li>• Channels created by the project: alliance meetings or events for wider audience, project website, newsletter/ e-newsletter, Facebook page, e-discussion group</li><li>• Sharing documentation products and reflections at events and meetings with alliance members and other stakeholders, engaging local media and others.</li></ul>

The project team or person(s) designing process documentation should spend some time considering who to interview, observe and involve. The starting point will be individuals and groups that are identified in the change theory as the direct stakeholders. These could be department heads, politicians or community leaders. It is also good to talk to some of the people who do not have a direct interest or stake in the process.

Collected information then must be compiled and organised into articles, photo books, video bites *etc.* These products should be easy to produce, so they can be rapidly disseminated during the course of the project. Short memos, a diary, murals, photo briefs and video bites are possible ‘quick’ outputs.

Organising the information collected involves filing and compiling. Some simple filing is needed to avoid having a complete chaos of unsorted materials (video sequences, loose photos, interview notes). A simple format for filing should be agreed and followed. This will make subsequent retrieval and use of the materials straightforward and save time later.

To disseminate the information you need information channels. Some channels should be created by the project while other existing ones may be mobilised. Local media can play a key role in facilitating this. E-mail and internet provide channels that can be managed easily by project staff.

Who documents?

Documentation may be done by ‘insiders’, such as project team members and core learning alliance members or beneficiaries of the intervention, and by ‘outsiders’ such as journalists or other critical thinkers who are not directly involved.

If process documentation tasks are in the hands of the project team, process documentation becomes an integrated project activity and reflection and learning will be systematic. It is also sensible to appoint someone to do the process documentation job. Because process documentation requires a certain amount of distance from the project objectives, those doing it are ideally not be involved in daily project work but can instead concentrate on capturing the process, organising the information, stimulating the reflection and analysis of the findings and disseminating the information.

Project staff often think in terms of solutions and give less attention to the intermediary steps between recognising problems and devising solutions. Time, tools, methods and procedures are therefore needed to reflect and analyse systematically in project teams and with a wider group of stakeholders. Whether internal or external the documenter’s job is not to judge, but to record and provide material for team reflection.

**Box 3.10.5 Lessons from practice: make time for systematic and joint reflection**

Often in busy projects reflection does not get sufficient attention. SWITCH was no exception! Although city teams liked the idea of process documentation, putting it into practice proved to be a challenge. Process documentation takes resources, time to observe, collect information, analyse and repackage it, and people with the interest and skills to do these things. It proved difficult for the SWITCH city teams to step back and reflect on the developments in their city. Some facilitators felt overstretched already and process documentation was an added burden. Some facilitators simply felt they did not have the skills or know how to go about it. Not all facilitators attended the training workshops and they may have lost out.

Learning alliances involve a wide group of stakeholders in joint action and research. Involving some stakeholders in process documentation stimulates their learning and reflection. For example, if district engineers go to communities to interview community members about planning of water service delivery, they become more aware of community realities and perspectives. Experience shows that learning alliances members often appreciate these concrete tasks. Procedures and formats are needed to feed the personal learning back to a shared platform or wider group of stakeholders (see also Abd-Alhadi *et al.*, 2006)

Involving 'outsiders' in process documentation has the advantage that outsiders already have more distance from project objectives. That allows them to observe the process of the project more clearly and critically. The relationship between project and outsider must be organised well. There is a delicate balance between the objective of achieving the project results and documenting project processes, including looking behind the scenes and revealing power constellations and factors that hamper change. An outsider should not affect the balance between the two objectives to the extent that project results or even continuation are endangered. The politics of the situation may impact on what documentation products or reflections will be published and discussed openly.

**Box 3.10.6 Lessons from practice: step back or let an outsider ask the questions**

High quality process documentation requires insider knowledge but also fresh eyes. SWITCH city assessments were a good way of bringing together outsiders and project team members for joint reflection, analysis and documentation.

Involving local journalists can be very useful for reaching out to the public, getting the attention of decision makers or creating a 'buzz' around research demonstration sites. The SWITCH team in Lodz initially put a lot of effort into raising media interest in urban water issues and SWITCH interventions. Over the course of the project, relations with local journalists improved dramatically. After two years, the team was being approached for requests for interviews so often that they struggled to meet the demand.

**Box 3.10.7 The process documentation specialist**

Process documentation specialists need specific skills. They should enjoy writing and be capable of compiling stories that people like to read from the large amounts of information gathered. Other skills would be helpful, (but may be provided by outsiders), such as photography, making simple video sequences, putting together a newsletter, composing a website, making flyers, posters and murals. The process documentation specialist should be willing to acquire good understanding of the change the project aims to achieve.

## Summary

During the course of a project or intervention, all kinds of events happen. Process documentation is a learning approach that tracks and documents the bumps and curves, and aims to improve project results by systematic reflection.

- Process documentation needs to be planned, managed and supported.
- Process documentation requires resources, especially people with skills and time.
- Process documentation can help reveal the logic of a project intervention in a way that is helpful for project implementers.
- High quality process documentation requires insider knowledge but also fresh eyes.

### References

- Abd-Alhadi, F.T. *et al.*, 2006. Effect of process documentation on building the capacities of EMPOWERS stakeholders for local governance (Middle East). In: Sustainable water supply and sanitation: Strengthening capacity for local governance 26-28 Sept 2006, Delft, the Netherlands [Online] Available at: [www.irc.nl/page/31141](http://www.irc.nl/page/31141) [Accessed 27 April 2011].
- Annie E. Casey Foundation, 2003. Topic paper process documentation. In: *Making connections a neighbourhood transformation family development initiative*. Baltimore, USA. [Online] Available at: <http://www.irc.nl/docsearch/title/172432> [Accessed 27 April 2011].
- Butterworth, J. *et al.*, 2008. *Building more effective partnerships for innovation in urban water management*. In: International conference on water and urban development paradigms: Towards an integration of engineering, design and management approaches 15-19 Sept 2008, Leuven, Belgium. Katholieke Universiteit: Leuven.
- Davies, R. & Dart, J., 2005. *The 'Most Significant Change' (MSC) technique: A guide to its use*. [Online] Available at: <http://www.mande.co.uk/docs/MSCGuide.htm> [Accessed 20 March 2011].
- GTZ, 1996. *Process Monitoring (ProM): Work document for project staff*. GTZ: Eschborn, Germany. [Online] Available at: <http://www2.gtz.de/dokumente/bib/96-1351.pdf> [Accessed 27 April 2011].
- Schouten, T., 2007. *Briefing Note on Process Documentation* (SWITCH project output). [Online] Available at: [http://www.switchurbanwater.eu/outputs/pdfs/WP6-2\\_BRN\\_6\\_Process\\_documentation.pdf](http://www.switchurbanwater.eu/outputs/pdfs/WP6-2_BRN_6_Process_documentation.pdf) [Accessed 27 April 2011].
- da Silva Wells, C., LeBorgne, E., Dickinson, N., & De Jong, D., (in press). *Documenting change: an introduction to process documentation*.

### Related websites and further reading

The SWITCH process documentation training weblog: <http://processdocumentation.wordpress.com/> [Accessed 27 April 2011].

Chavez-Tafur, J., Hampson, K., Ingevall, A. & Thijssen, R., 2007. Learning from experience; a manual of organizing, analysing and documenting field based information. ILEIA, Centre for Information on Low External Input and Sustainable Agriculture: The Netherlands. [Online] Available at: [http://www.agriculturesnetwork.org/resources/documentation/tools/list\\_books-guides-and-manuals/learning-from-experience](http://www.agriculturesnetwork.org/resources/documentation/tools/list_books-guides-and-manuals/learning-from-experience) [Accessed 27 April 2011]. This manual provides practical guidance on documentation and joint learning.

Evans, A., Varma, S., da Silva Wells, C. & Jinapala K., 2009. Attitudes and actions of participants in multi-stakeholder processes and platforms. *Knowledge Management for Development Journal*, 2009 5 (3), pp. 201–214. This article presents lessons from process documentation in the WASPA-Asia project and a SWOT analysis of process documentation.

Long, N., & van der Ploeg, J.D., 1989. Demythologizing planned intervention: An actor perspective. *Sociologia Ruralis*, 1989, 24 (34), pp. 226–248. This article deals with the 'bumpy road' of planned interventions, and provides a reflection on how history, culture, attitudes, relationships and patterns of power and decision making affect intervention results.

Monitoring and Evaluation NEWS: A news service focusing on developments in monitoring and evaluation methods relevant to development programmes with social development objectives. This site has practical information on monitoring techniques, such as MSC. <http://mande.co.uk> [Accessed 27 April 2011].

Schouten, T. *et al.*, 2007. *The Inside Story: Process Documentation Experiences from EMPOWERS*. Inter-Islamic Network on Water Resources Development and Management (INWRDAM): Amman, Jordan. [Online] Available at: <http://www.project.empowers.info/page/3287> [Accessed 27 April 2011]. This booklet presents lessons on doing process documentation and practical examples of process documentation.

Producing information materials through participatory writeshops- A writeshop is a participatory process of documenting good practices and experiences. Experienced people come together and document their experiences, with the support of facilitators and other participants (who provide peer review). The facilitation includes feedback to the authors; editorial support for good language; support from illustrator for visualising the experiences. In a writeshop, each participant is an author. For more on the method see <http://www.mamud.com/writeshop.htm> [Accessed 27 April 2011].



*This guideline presents a simple framework that was used in SWITCH for monitoring and evaluating with a focus on actors and outcomes. The use of descriptive ‘micro-scenarios’ for recording stakeholders perceptions of change on key indicators can complement other monitoring and evaluation methods.*

## Key concepts

### Outputs

Outputs are the products of the project – the deliverables; the things you have committed yourself to doing. These can be easily measured and ticked off. They may tell you how much you have done but probably not how well you have done it. They include infrastructure built, people trained, publications produced etc. In terms of SWITCH they include the demonstration projects and the research.

### Outcomes

Outcomes are the short or medium term changes in relationships, activities, actions, knowledge or behaviours of the intervention partners (institutions and individuals, including beneficiaries) that can be linked to project activities, (although not necessarily caused by these alone). An integrated urban water plan or a functioning learning alliance and the resulting improved working relationships may be two outcomes of SWITCH in many cities.

### Impacts

Impacts are the ultimate, positive and negative, intended or unintended, primary and secondary long term effects produced by a development intervention, directly or indirectly, on beneficiaries or other people. For SWITCH these may include long term benefits in the city’s water management and the subsequent improved environment and access to water, or permanently transformed relationships between key stakeholders in the city. It is notoriously difficult with projects for social change to show “attribution” for impacts – i.e. that the long-term changes were due to the intervention, because of the number of supporting and conflicting factors.

### Theory of change

The theory of change for a project is a hypothesis about the causal link between interventions and outcomes and impacts – the project story about why what it is doing should have a beneficial impact.

# 3.11

Teacher pointing out the features of a demonstration project, Belo Horizonte, Brasil. (Photo credit: Stef Smits)

## Monitoring success and less

John Butterworth and Carmen da Silva Wells

<i>Micro-scenarios</i>	Narrative description of different levels of change relating to a specific indicator. Each scenario has a corresponding score (0-100). Stakeholders identify the current score and justification for that score. This method is also called ‘descriptive ordinal scoring’.
Qualitative Information Appraisal (QIA)	The micro scenarios approach in SWITCH draws on Qualitative Information Appraisal (QIA), a participatory method to record people’s perceptions, and to translate descriptions into scores and numbers. QIA was in turn based on the Methodology for Participatory Assessment (MPA) designed for a global study involving IRC, WSP and partners.

*Definitions for outputs, outcomes and impacts are loosely adapted from Evaluating and Improving the WASH sector – IRC Thematic Overview Paper 23 (Garandeau, Casella & Bostoen, 2009).*

## Introduction

Monitoring and Evaluation (M&E) is an integral part of good project management. At the most basic level it may consist of simply tracking to what extent the intended deliverables of a project were completed on time and to a sufficient standard. However, in complex, multi-stakeholder, multi-disciplinary, learning-orientated and innovation-focused projects like SWITCH, M&E needs to look beyond outputs.

But, monitoring impacts is possibly a step too far. For example, SWITCH aimed to help cities develop integrated approaches and more sustainable, more efficient, more socially inclusive water management. Indicators of most of these changes could realistically only be expected to change significantly over a timescale of decades, well after the end of the 5-year SWITCH project. Furthermore, these impacts will not easily be attributed to project interventions, because a lot of other actors and factors are driving innovation and change in urban water management. Hence monitoring impacts, while important and necessary, will probably be too late and too distant to influence project implementation. So what is the alternative?

The SWITCH project and its learning alliances focused on identifying intended project outcomes and monitoring change towards their achievement in an approach that can contribute to learning. Outcomes are more significant than the production of deliverables, but they also reflect more immediate changes than the ultimate impacts (that may be remote and difficult to link to the intervention). This guideline describes the outcome monitoring indicators that were used by the SWITCH city alliances to monitor change resulting from the learning alliance process and other project activities.

### Using micro-scenarios to assess whether positive changes were happening?

Although it may be possible to plan the goal of a project, it is almost impossible to design the right set of actions at the outset to achieve this goal in different cities. And even if it were, the daily reality in cities is constantly shifting. People change positions, institutions evolve, politics follows its course and innovation (hopefully) happens. For these reasons, project design needs to be revisited. Projects need to continually learn and re-orientate themselves in order to be successful. In SWITCH, this learning was facilitated by the city level learning alliances.

Integrated urban water management (IUWM) involves changes in ‘hardware’ (e.g. the number of people served by a water supply systems, kilometres of pipeline installed, number of toilets, *etc.*) and ‘software’ (e.g. perceptions, behaviour change, collaboration *etc.*). Learning alliances were chosen as the key tool within SWITCH to catalyse most of these software changes. Learning alliances in SWITCH were intended to break down barriers to information sharing and learning within cities, and speed up processes of identification, development and uptake of solutions related to urban water management.

How is it possible to assess whether this is working and learning alliances are doing their job? A mix of quantitative and qualitative indicators is needed in order to draw meaningful conclusions on changes achieved. One method that is suitable for monitoring these outcomes, is known as descriptive ordinal scoring or ‘micro-scenarios’. These are based on a form of Qualitative Information Appraisal (see Key Concepts) and seek to describe possible states for various indicators and attribute scores. Project teams or members of the learning alliances assess their own progress towards the key indicators and set the scores. In practice in SWITCH, the scoring was more often than not done by the city teams.

Because SWITCH allocated relatively limited resources for monitoring, the learning alliances support group in SWITCH provided a generic set of output indicators for each city, which was then further adapted and used by the teams in each city. Micro-scenarios should complement other approaches to monitoring such as process documentation (see Guideline 3.10) or M&E methods that are specifically adapted to monitoring at outcome level such as ‘most significant change’ or outcome mapping, but in practice this did not happen within SWITCH, due to lack of time and resources, and possibly lack of skills to complete these more complex forms of M&E.

The objectives chosen in SWITCH related to learning alliance membership and communication between stakeholders; learning alliance events and involvement of members in research demonstration activities; and documentation for learning and reflection among alliance members.

Box 3.11.1 Micro-scenarios as a framework for M&E within SWITCH city learning alliances

Micro-scenarios are used to identify different levels of achievement of a mainly qualitative change that can be objectively assessed in a participatory way. Setting up and using ‘micro-scenarios’ involves a number of steps:

- Identify key change objectives together with stakeholders. These are the indicators that will be measured. They could be anything from the level of activity of learning alliance members to how far research is put into use. It is important to ensure unambiguous wording so that all involved have a shared understanding.
- Identify the different levels: The ‘micro-scenarios’ describe the different states that might exist with each level being given a score on a scale of 0-100. Define the key words that distinguish each level, as this will help when coming to score.
- Identify a ‘benchmark’: the minimum acceptable level that you are aiming for within the project – usually the minimum benchmark is given the middle score of 50, so there is scope for degree of under- or over-achievement.
- Identify a ‘baseline’: the current level.
- Monitor at regular intervals: record, reflect and discuss why has change taken place (or not).
- Identify what further actions are required to improve for each of the benchmarks.

Key elements of the method are:

- Stakeholders choose the micro-scenario that most adequately reflects the situation.
- Ordinal scoring options are benchmarked and peer-reviewed.
- The reason for a specific score is recorded.

# Objectives, indicators and scenarios for SWITCH learning alliances

The following section provides the monitoring indicators used to monitor the learning alliances in SWITCH. The objectives and their indicators were agreed in a workshop involving project teams from most SWITCH cities. Four common objectives, considered to be the most critical were identified. The common indicators and scenarios allowed for comparison across cities. Cities additionally identified one to three extra city specific objectives.

The list of objectives was not meant to be comprehensive, but was seen as a way to start monitoring learning alliance performance. In all cases the indicators, their wording and benchmarks needed to be adapted within cities and changes agreed with learning alliances. The scenarios needed to be pre-tested so that the wording suited the specific context.

**Objective 1:** *“We know who learning alliance members are, and facilitate communication between them effectively.”* Indicators are the availability of a record of learning alliance members and their participation in learning alliance events and activities and the use of effective communication tools to share information between learning alliance members.

Scenarios for objective 1	Score
There is no accessible record of learning alliance members, and their involvement in various events and activities	0
There is an out-of-date record of learning alliance members and their involvement in events and activities	25
There is an up-to-date record of learning alliance members and their involvement, and some basic communication tools are systematically used (e.g. email, phone) between events	50 benchmark
There is an up-to-date record of learning alliance members and their involvement, and archives are maintained through systematic use of advanced communication tools (e.g. a Google group).	75
Member information is accessible to all (e.g. online database), participation in all events and activities is systematically recorded and a combination of methods is used effectively (based on feedback received) to communicate between events.	100
Justification of score (with date)	Score awarded

**Objective 2:** “Regular, effective and innovative events capture and sustain interest of learning alliance members.” Indicators are the regularity and quality of events organised or supported by SWITCH learning alliances. These aspects may be assessed with reference to reports of activities, evaluation sessions and the follow-up generated by events.

Scenarios for objective 2	Score
Events (e.g. workshops, site visits, seminars) are not regular and only announced at the last minute.	0
Regular events are held at least every six months, but have limited impact in capturing the interest of learning alliance members.	25
Appropriate events are announced well in advance and use a mix of mainly standard methods to effectively engage interest of city stakeholders at least once every 3 months.	50 benchmark
Quarterly (or more frequent) events use effective and innovative facilitation methods (not just presentations and discussion).	75
Quarterly (or more frequent) innovative events result in high-quality reports (or other outputs) that capture content and ideas and are rapidly made available.	100
<i>Justification of score (with date)</i>	<i>Score awarded</i>

**Objective 3:** “Demonstration activities are undertaken within a framework for scaling-up.” Indicators are the availability of demonstration plans, the level of ownership of these plans, and commitments made to scaling-up implementation.

Scenarios for objective 3	Score
Demonstration activities are initiated without significant discussion in the learning alliance	0
Demonstration activities are decided after limited consultation with some members of the learning alliance	25
Demonstration activity plans are consistent and integrated within LA plans (city storylines) and are supported but without clear commitments to scaling-up	50 benchmark
Learning alliance members with potential to scale up demonstration activities pro-actively made suggestions and proposals that were addressed in demonstration plans.	75
Learning alliance members maintain a keen interest in demonstration activities at all stages and report back against their initial commitments to scale-up interventions.	100
<i>Justification of score (with date)</i>	<i>Score awarded</i>

**Objective 4:** “The SWITCH team and learning alliance understand why change is occurring in IUWM, not just what happens.” Indicators are the amount and quality of process documentation undertaken to capture the change process and its dimensions and motivations, and the sharing of that information to encourage learning.

Scenarios for objective 4	Score
No process documentation is in place	0
Occasional ad-hoc process documentation is undertaken using some of available tools (including different media such as writing, photography, film etc.) but with limited attention to detail or quality.	25
A few process documentation tools are used regularly following a process documentation plan but results are not widely shared.	50 benchmark
Several process documentation tools are used regularly and results are widely shared within the learning alliance	75
Effective process documentation is used for reflection and analysis that results in improved project implementation plans	100
<i>Justification of score (with date)</i>	<i>Score awarded</i>

In addition to these four common indicators, some cities also added their own, including the following indicators (detailed scenarios have been omitted). The most common addition was to measure efforts to increase social inclusion.

## Accra

**Additional objective A1:** “We know what is going on in the IUWM sector in Accra.” Indicators are the availability of information on issues of IUWM, sharing among learning alliance members and their active participation in keeping accessible information updated.

**Additional objective A2:** “We involve marginalised groups in learning alliance meetings.” Indicators are the availability of information on issues of IUWM, sharing among learning alliance members and their active participation in keeping accessible information updated.

## Alexandria

**Additional objective AL1:** “Stakeholders support social inclusion and efforts are made to eradicate exclusion.” Indicators are how research incorporates marginalised groups and their participation in the learning alliance and city council.

**Additional objective AL2:** “Wide participation and support for the Integrated Urban Water Management (IUWM) planning process.” Indicators are the level of participation of learning alliance members in different tasks and aspects of the planning process.

## Belo Horizonte

**Additional objective B1:** “A regular, quality flow of information between learning alliance members.” Indicators are the way (and timeliness) with which learning alliance members initiate and share information.

**Additional objective B2:** “Stakeholders are involved in priority setting in research.”

Indicators are the type of involvement of learning members in research priority setting and communication of decisions taken.

**Additional objective B3:** “Regular communication, awareness raising and advocacy are undertaken in the city around the topic of urban water.” Indicators are the planning of activities, level of activities undertaken and learning from what works best in the city.

## Birmingham

**Additional objective BM1:** “Inclusion within active learning alliance membership of key stakeholders that have been only peripheral to the learning alliance process to date.”

Indicators are targeted efforts to involve and include identified peripheral but important stakeholders (developers, Association of British Insurers, local community/environmental groups *etc.*) and the resulting engagement.

## Hamburg

**Additional objective H1:** “Residents, consumers and socially marginalised groups are introduced to the learning alliance and take part in the process.” Indicators are targeted activities to engage residents, consumers and socially marginalised groups within the learning alliance process, the use of appropriate tools, and levels of representation and engagement.

**Additional objective H2:** “An IUWM plan informed by connected demonstration project, is developed and adopted by the learning alliance members.” Indicators are the completion of an IUWM planning process and the acceptance and use of the plan by stakeholders, including activities to implement the plan.

## Lodz

**Additional objective L1:** “Issues of social inclusion (gender, poverty, other marginalised groups *etc.*) are systematically mainstreamed across all SWITCH activities in the city.”

Indicators are the level of awareness within the research team, and action to address social inclusion in planning activities across all work packages and in the wider activities of the learning alliance members.

## Summary

Monitoring is a necessity for projects that seek to bring about change – it is the only way to know whether and how to adjust interventions. However resources (time, money and people) are often lacking to carry out elaborate evaluation while the project is still active.

It is not possible to monitor long term impact during the course of a project, and not particularly useful to monitor only outputs.

SWITCH used ‘micro-scenarios’ to monitor four indicators that were agreed by the whole SWITCH project team and extra indicators decided by each city.

Some learning alliances visited these indicators regularly as part of their quarterly reporting. When used as a workshop exercise they helped the teams to focus on what needed to be done to improve project performance. However, in practice they were not widely used by facilitators with the whole learning alliance or by the wider SWITCH project management.

At best, the micro-scenarios method can be:

- A flexible system to capture and manage qualitative information...
- which can be tailored to suit local conditions and needs...
- and generate uniform and comparable qualitative information....
- that can link assessment and action....
- for project management and other stakeholders.

### Acronyms

IUWM	Integrated Urban Water Management
M&E	Monitoring and evaluation
QIA	Qualitative Information Appraisal

### References

Garandeau, R., Casella, D. & Bostoen, K., 2009. *Evaluating & Improving the WASH Sector - Strengthening WASH Governance, Learning about Complexity, Assessing Change* (IRC Thematic Overview Paper 23 June 2009). [Online] Available at: [http://www.irc.nl/download/content/144212/460667/petermcintyre%40btconnect.com/TOP23\\_EvaluatingWASH.pdf](http://www.irc.nl/download/content/144212/460667/petermcintyre%40btconnect.com/TOP23_EvaluatingWASH.pdf) [Accessed 28 April 2011].

### Related websites and further reading

Dayal, R., van Wijk, C. & Mukherjee, N., 2001. *Methodology for Participatory Assessments: With Communities, Institutions and Policy Makers*. WSP and IRC. [Online] Available at: [http://www.wsp.org/wsp/sites/wsp.org/files/publications/global\\_metguideall.pdf](http://www.wsp.org/wsp/sites/wsp.org/files/publications/global_metguideall.pdf) [Accessed 28 April 2011].

Davies, R. & Dart, J., 2005. *The ‘Most Significant Change’ (MSC) technique: a guide to its use*. [Online] Available at: <http://mande.co.uk/special-issues/most-significant-change-msc/> [Accessed 28 April 2011].

Guijt, I., & Woodhill, J., 2002. *Managing for impact in rural development: A guide for project M&E*. International Fund for Agricultural Development: Rome, Italy.

James, A.J., Postma, L. & Otte, C., (in press). *Qualitative information appraisal: Using people's perceptions in large development projects*. IRC International Water and Sanitation Centre: The Netherlands.

Outcome mapping: [www.outcomemapping.ca](http://www.outcomemapping.ca) [Accessed 28 April 2011].

Qualitative Information Systems: [www.irc.nl/page/12940](http://www.irc.nl/page/12940).

Shordt, K., 2004. *Making monitoring simple and useful*. [Online] Available at: [www.irc.nl/page/15628](http://www.irc.nl/page/15628) [Accessed 28 April 2011].

*Integrated urban water management is challenging because it requires improvements in governance. Two key elements of governance include mechanisms and processes on the one hand, and structures or institutions on the other. Integrated urban water management requires making connections between sub-sectors or functions of government and civil society; institutions and organisations that are traditionally separate. A well-balanced and adequate understanding of water governance in a particular city depends on inputs from key stakeholders and a skilled analyst. This Guideline argues that understanding and improving governance are challenging, but crucial foundations for achieving change in the way that water is managed.*

## Key concepts

### *Governance*

Governance can be defined as the mechanisms, processes, and institutions through which stakeholders articulate their interests, mediate their differences, and exercise their legal rights and obligations. It relates to how authority is exercised in a context.

### *Institutional mapping*

An institutional map identifies which institutions have the power to deliver, fund or otherwise influence the successful up-take of the different technical measures proposed in order to deliver IUWM. It focuses on the key actors, their interactions, where power is located, who has the ability to influence decisions, and who makes decisions.

## Introduction

At the Rio Earth Summit (1992) good governance was identified as a precondition for achieving sustainable development. This was embodied in Agenda 21, the 'global action plan', which through the Local Agenda 21 initiative urged local authorities to enter into dialogue with their citizens, local organisations and private enterprises as an initiatory step to realising sustainable development.

# 3.12

## Engaging with the realities of governance

Carmen da Silva Wells, John Butterworth, Allistair Sutherland and Colin Green

Public latrines in Old Fadama in Accra, Ghana. (Photo credit: Peter Dicampo)

Although there are multiple definitions of governance, most acknowledge the role and importance of civil society and the private sector as well as government, and many associate good governance with greater accountability, participation, transparency and equity in the development processes.

The learning alliance approach is empathetic with this approach – in its fullest form it includes stakeholders from all these groups, although in SWITCH, it has usually been limited to those most closely involved with researching and tackling urban water management problems.

Improving integration in urban water management requires governance issues to be addressed, to explore the extent to which policies, legislation, power relations and processes external to a project provide room to implement proposed solutions. Urban water governance involves complex processes, mechanisms, and institutions through which stakeholders articulate their interests, mediate their differences, and exercise their legal rights and obligations with respect to water management.

Governance is not synonymous with government. Rather, it is about how governments, institutions and social organisations interact with citizens when making decisions and implementing them. It is the process of decision making which determines how decisions are taken and who has the power, and in what capacity, to make or influence decisions. It is also about who is held accountable for these decisions.

Governance relates to how authority and influence are exercised in a particular context. Authority implies that power and influence are exercised ‘legitimately’; that there are recognised rules (including legal rights and obligations) about who can decide what and under what circumstances.

## How is governance linked to multi-stakeholder involvement?

SWITCH aimed to do ‘better’ in urban water management. Doing ‘better’ means several things: 1) making ‘better’ choices than in the past, 2) being more successful in implementing those choices, and 3) having better options to select from and implement. The first two challenges are central to improved water governance. However, ensuring uptake of good innovations is not straightforward.

Urban water management is characterised by fragmented decision making, limited stakeholder engagement, conflicting policies, and in some cases, weak engagement by municipal authorities in the planning and regulation of water related services. Complexity arises because of the many different organisations and individuals involved, and also because each actor has different interests, understandings and amounts of power. Stakeholder engagement in the process of developing and applying new knowledge is

therefore crucial. Successful innovation will also require an understanding of governance and the changes that would be needed to in order to implement the proposed innovations. This will often require major inputs from key stakeholders, linked to the concept of ‘good governance’.

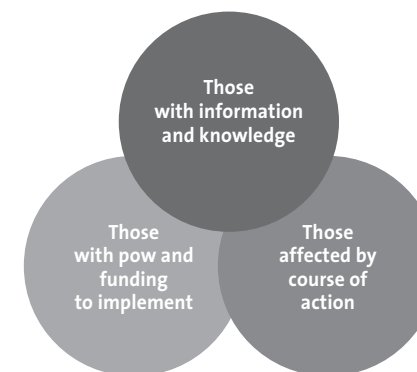
## Institutions and institutional mapping

Institutions are defined as systems of rules, either formal or informal, and those rules define the boundaries of any institution. For the purposes of water management, institutions are likely to be organisations that have a recognised role in water management (such as a water supply company or a water board), or are able to clearly articulate their interest in water management (such as a water user association). These entities are recognised to have authority, power and influence (or at least a legitimate voice) in relation to water management.

Achieving greater integration in water management involves either designing new institutions which suit the physical boundaries of the systems to be managed, or improving cooperation or co-ordination between existing institutions. The starting point for both approaches has to be the development of a local institutional map which identifies which institutions have the power to deliver, fund or otherwise influence the successful up-take of the different technical measures being considered. It focuses on the key actors, their interactions, where power is located, who has the ability to influence decisions, and who makes decisions.

From an institutional delivery perspective, there are three different groups of such stakeholders (Figure 3.12.1).

Figure 3.12.1 Stakeholders in service delivery



## Challenges of understanding governance

Understanding governance can be challenging for a number of reasons. It requires access to adequate information. In a particular city, there may be one or more individuals who have a very good understanding of how water governance works. This understanding may be internalised (even guarded), and so not readily accessible to other stakeholders. An individual's understanding (and perhaps that of an institution) will be deficient in one or more areas. The extent of this challenge will vary from one country and city to another. For example in the UK, where the water sector is centralised and strongly regulated through underpinning legislation and policy guidance that is generally enforced, most of the information for a governance analysis is available in existing documents via the internet. This was the case for the mapping of water governance undertaken for Birmingham by a team from Middlesex University which was undertaken largely as a desk study (Green, *et al.*, 2007). By contrast, in Accra, Ghana which has a similar legislation and formal institutional structures to Birmingham, governance information was not easily accessible on the internet or published documents.

When information has been accessed, a second challenge is how this information can be analysed in a strategic and balanced way. In most cases quite sophisticated qualitative analysis will be required if the information is to be presented in a way that points to opportunities for improving water governance. A well-balanced and adequate understanding of water governance in a particular city depends on inputs from key stakeholders and a skilled analyst.

One challenge is ensuring that data and analyses of water governance are seen to be 'balanced'. For example if the governance of mains water and sewerage services serving the minority of a city's population are well documented, while the informal water services covering the majority of the population is not, there is a risk that the analysis will be unbalanced. Moreover, it is almost inevitable that any analyst involved in this process will have particular interests and technical experience, and may have strong views on certain aspects of water governance that influence their analysis (e.g. economic governance issues such as privatisation of water supply services or installation of water meters).

Analysis requires qualitative analysis skills and also experience in engaging others to progress the analysis. Water engineers may have an in-depth and first-hand knowledge of governance issues relevant to their role in the water cycle, but are not usually trained in qualitative analysis or participatory action research methods.

## From mapping to improved governance

Even with an adequate understanding of water governance, it is very difficult to improve governance without making changes to rules and practices. Agreeing such changes may require a process of mediation between key stakeholders, and also a process of drafting legislation and policies to support implementation of the proposed change. This takes time and requires inputs from a range of key stakeholders, each with their particular interests and ideas. For example, agreeing on legislation and a policy on sustainable urban drainage systems (SUDS) requires inputs from public and private agencies involved with water management and infrastructure development. Legislation and written policies are mechanisms to support implementation. Once changes have been formulated in policies and legislation, implementation involves a further process of negotiation, influence and enforcement, because individuals or organisations may be resistant to change the way they do things. For example implementing an agreed SUDS policy requires negotiation with property developers and property owners and enforcement in cases of non-compliance.

Making and implementing changes in any particular city also depends on the governance structures and processes already in place. It may require activities at other administrative levels.

### Box 3.12.1 Addressing governance in SWITCH

- In Birmingham, addressing governance required inputs at national level. Fortuitously, one of the SWITCH governance mapping team members was appointed as a Specialist Advisor to the UK House of Commons EFRA Select Committee Inquiry into the 2007 floods. Some of the results from the institutional mapping of Birmingham were used by this Committee to identify the problems of integrating surface water drainage and also informed the framing of subsequent UK legislation on floods.
- The situation was different in Lodz, where the city authorities have a relatively greater authority in water governance matters. Here, the challenge was not so much in stakeholders agreeing changes in water governance, but in facilitating a social learning process. The city learning alliance brought key stakeholders around the table, encouraged them to listen to each other and to focus on shared problems and opportunities facing the city, and supported them to agree what improvements they could make through the existing governance arrangements (Wagner *et al.*, 2009).
- In Beijing, a very large and fast changing city with complex governance arrangements, a multi-stakeholder platform was not considered as an effective mechanism for agreeing changes relating to water management for urban agriculture. Instead facilitated bilateral meetings allowed stakeholders to meet informally, advocate and agree changes to practice. A multi-stakeholder meeting with authorities could then subsequently be used to ratify any changes that had been agreed informally.



## Learning alliance membership and influence on innovation processes

Where learning alliances are strong and have a broad-based membership which is actively engaged and committed to IUWM, there is more scope to engage with governance issues and processes. In a city where the alliance is less active and marginalised stakeholders are not represented, there is limited scope for engaging with governance issues. Instead the focus may be more on discussion of technical and policy options or on future aspirations relating to technical integration and environmental sustainability. Some lessons on addressing urban water governance are summarised in Box 3.12.2.

### Box 3.12.2 Lessons on addressing urban water governance

- Accessing information is often difficult. Achieving an adequate understanding of water governance often requires major inputs from key stakeholders who have this information.
- Doing governance analysis requires specialist knowledge and an understanding of the context. It is useful to contract local experts who have undertaken previous research on aspects of water governance and have established a network among key stakeholders.
- Changes to water governance are likely to be constrained by the historical institutional and technological context of a particular city. Previous decisions, for example choice of technology, may constrain current and future decisions about water governance arrangements and technical options. (Green *et al.*, 2007).
- Where learning alliances have effective representation from marginalised groups, they may provide a forum where concerns over water governance can be articulated.
- Addressing water governance often requires engaging with national level policy makers and other stakeholder groups who may not be part of a city learning alliance.

### How is governance linked to processes of social inclusion and exclusion?

The answer to this question varies between cities, largely depending on the extent to which the residents are content with, concerned about, and able to influence water management. In cities where the majority of households are connected to centralised water supply and wastewater management systems which operate effectively and reliably, citizens may be less interested to engage with water management issues.

Issues of social exclusion arise if problems are concentrated in poorer parts of the city. In the poorer cities, where most households are not connected to mains water and sanitation networks, issues of social exclusion are likely to be more important. Moreover, citizens are more directly involved in 'self-help' water management (or "mismanagement"), and are likely to be negatively labelled (for example as polluters, illegal connectors, water vendors). Such cities show greater diversity in terms of sub-systems, institutional arrangements, and technical options for water management.

In cities where a large portion of the population is not connected to mains water supply and wastewater treatment infrastructure, it may also be difficult to access reliable data. In this case undertaking a governance analysis will require an understanding of the informal sector and mechanisms of social exclusion. Guideline 3.8 provides a closer look at social inclusion.

## Summary

Gaining an adequate understanding of the current water governance mechanisms, processes and institutions is a prerequisite for any initiative that aims to provide feasible alternatives for the future. Governance shapes the way services are planned, managed and regulated within political social and economic systems. Understanding and improving governance presents challenges and takes time. SWITCH, like many other research projects, proposed new approaches and technologies. To ensure that these were put into practice and to find new and better ways of managing water in cities, required a sound understanding of formal and informal rules, power relations and the context in which proposed changes were to be implemented. Stakeholders needed to change their cognitive maps in the mind; while formal policies, rules and regulations also needed to be addressed. The process of institutional mapping helped to link technologies and issues around IUWM with the processes, structures and outcomes of decision-making known as governance.

**Box 3.12.3 Tips and tricks**

- Gaining a well balanced and adequate understanding of water governance in a particular city will require inputs from key stakeholders and an analyst with local knowledge, social science research skills and writing skills.
- Governance analysis should be undertaken using an inter-disciplinary approach, with inputs from those proposing technological and institutional innovations for particular cities.
- Bringing stakeholder together does not mean working with all stakeholders at the same time and place: that is impractical. It is important, therefore, to understand which stakeholders are key to achieving a particular change. Stakeholder analysis will help to determine which stakeholders should be involved, when and how.

**Acronyms**

EFRA	Environment, Food and Rural Affairs
IUWM	Integrated Urban Water Management
SUDS	Sustainable Urban Drainage Systems
UK	United Kingdom

**References**

Green, C., Johnson, C. & Parker, D., 2007. *Institutional arrangements and mapping for the governance of sustainable urban water management technologies. Mapping protocol and case study of Birmingham, England* (Deliverable Task 6.1, May 2007). EU 6th Framework SWITCH Project, Sustainable Water Management in the City of the Future. [Online] Available at: [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/W6-1\\_CBIR\\_RPT\\_D6.1.2b\\_Mapping\\_Protocol\\_Case\\_Study\\_Birmingham.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/W6-1_CBIR_RPT_D6.1.2b_Mapping_Protocol_Case_Study_Birmingham.pdf) [Accessed 30 June 2011].

Wagner, I., da Silva Wells, C., Butterworth, J. & Dziegielewska-Geitz, M., 2009. *Reflection on the achievements and lessons from the SWITCH urban water management initiative in Lodz, Poland*. [Online] Available at: <http://www.irc.nl/page/61360> [Accessed 28 April 2011].

**Related website and further reading**

Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organisations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment: <http://www.un.org/esa/dsd/agenda21/>



# 3.13

Water day at the Anne Frank School in Belo Horizonte, Brazil. (Photo credit: Thiago Salles)

## Facilitating creative workshops

Joep Verhagen and Bertha Darteh

*Workshops are an essential part of a learning alliance process, providing an opportunity for stakeholders to focus on specific challenges or to improve knowledge and skills. Workshops bring together adults, all of whom have experience and their own expertise. Some may be experts in the topic under discussion, but in a well-run workshop all participants learn from each other, and it is important to follow the principles of adult learning. Workshops should provide space for creative thought and not overcrowd the agenda. If facilitated creatively, they can be extremely effective events in the learning alliance process.*

### Adult learning and facilitation

Workshops are often milestone events that formalise discussions, plan activities and hold debates that have been initiated informally at different levels. Workshops serve many other purposes such as sharing knowledge, joint planning, initiating dialogue, *etc.* What all good workshops have in common is that they lead to a different behaviour on the part of the participants after the workshop. Sometimes these changes relate to the way participants collaborate or communicate with each other; sometimes workshops seek to change the way people or institutions function.

Influencing the behaviour of people and organisations is a wide and complex topic, and in this briefing note we limit ourselves to briefly introducing the principle of adult learning. In contrast to children, adults are slow learners especially when it comes to doing things differently, but they are keen learners when they can see relevance to their work or concerns. Adults continuously question whether they can use what they are being taught. Topics that are relevant and linked to day-to-day practices can be a big motivator, but if the links are not clear that can be a strong inhibitor to learning.

Box 3.13.1 Principles of adult learning

1.

Adults must want to learn – they learn best when they have an inner motivation.

2.

Adults learn only what they feel they need to know. A workshop needs to be practical and directly applicable or relevant.

3.

Adults learn by doing – they need to be able to use and apply new skills immediately.

4.

Adult learning focuses on real-life problems. Adults start looking for a solution

5.

Past experience affects adult learning in a positive and a negative way – every adult comes with their own store of knowledge, but may also carry ‘baggage’ that holds them back.

6.

Adults learn best in an informal situation – the environment should be relaxed, informal and inviting.

7.

Adults want guidance – not instruction. They want to choose the best options.

Adapted from the Canadian Literacy and Learning Network.

Role of facilitator

From Box 3.13.1, it can be seen that workshops should seek to create room for participants to share experiences and learn from each other around practical real life issues in a stimulating atmosphere. The main responsibility of a facilitator is to create an environment that is conducive for mutual learning, leading to participants doing things differently after the workshop. Depending on the precise purpose of the workshop, the facilitator has to balance a number of roles.

Table 3.13.1 The facilitator’s role in the workshop

People	Outputs
Process oriented:guiding exercises, developing and leading the flow of the workshop, etc.	Content/expertise oriented:bringing new expertise, ensuring content quality of the workshop, etc.
Human relations: focusing on the participation of all, inclusiveness, well-being of participants, etc.	Task oriented:making sure that things get done, decisions are made, etc.
Participatory:leaving room for participants to determine content of exercises and programme of workshop,	Directive: providing clear guidelines how things need to be done,

The facilitator needs to balance the people-oriented and output-oriented roles. In some cases, the facilitator must step forward to ensure that discussion leads to concrete decisions; in other circumstance the facilitator stays in the background and lets things run their course. Playing these different roles requires openness, respect, content knowledge, dedication, and experience. Acquiring these skills requires practice, trial and lots of errors.

Planning a workshop

Planning a successful workshop starts with being clear about the aims and the outline content. Why is the workshop being held? Who wants to take part? Who needs to take part? Will it be a duty or a pleasure for them? Will it be at a convenient place and time? Will participants find it affordable in terms of their time and competing commitments? Will their bosses encourage or allow them to attend? Do you have the right expertise available? The answers to these questions give you a basis for a ‘go’/ ‘no go’ decision as to whether the workshop takes place.

Allow sufficient time for preparation and for reporting. As a rule of thumb, one should build in at least half a day of preparation for each day of the workshop. Reporting during and after the workshop is essential to capture the learning and as an input in follow-up workshops. Documentation and facilitation are almost impossible to combine in one person, so one or other task should be a team effort or someone should be brought in to do it.

- There are no fixed templates for workshop programmes. However, the following things should be taken into consideration:
- It is important to manage the energy and enthusiasm of participants (and the facilitator), especially for workshops that last for more than two days. Do not overload the programme, allow sufficient breaks, and keep the length of the day within reasonable limits. This ensures that the second half of the workshop remains effective. Breaks create opportunities for informal interactions between participants, and these are an essential part of a workshop.
  - Send out at least a rough outline of the workshop in advance so that participants are clear about what is on offer, and what is not. This will stimulate enthusiasm.
  - The date for the workshop is very important especially if there are competing events that the stakeholders will have to deal with. Plan your workshop to avoid ‘meeting fatigue’. Workshops dates should be well spaced out if possible.
  - Unless people are travelling away from the area where they work or live; 3-4 day workshops may be difficult to organise. When stakeholders have to travel from their workplace or home to the workshop every day, it may be easier/better to organise a maximum of a 2-day workshop.
  - Choose a venue that is easily accessible by most stakeholders. But also think about unusual venues to break out of the classroom. A social inclusion workshop in Accra in 2008 was held on a farm with farmers and the venue made it a very interesting meeting.
  - Present the objectives of the workshop on day 1 and ask participants about their expectations. Halfway through the workshop, check progress against objectives and expectations, and adjust the second half of the programme.
  - The level of participation may need to be gradually increased especially when participants hold senior positions and are used to more traditional workshop formats. Step by step handing over the workshop to the participants is often more effective than ‘forcing’ participants into participation early on.

- As part of the gradual transformation of the workshop to a participatory exercise, the layout of tables and chairs can become less formal as the workshop progresses.
- A short reflection at the end of the day reinforces learning. Learning takes place best when this includes a short personal reflection by each participant. Sharing 'take home' messages can further stimulate learning and serve as icing on the cake.
- A short summary at the start of each day serves a similar purpose. Recapitulation becomes more effective when done by one of the participants and actively involves all participants. The 'rapporteur' may prepare a short news item with questions and answers, or a quiz. Something light and fun helps to get everyone back in the groove.
- Most importantly, ensure enough flexibility in the programme. In almost every workshop, new issues are brought forward whilst other issues appear less relevant than expected. It is important to get feedback from participants on a daily basis and adapt the programme as necessary.
- It is useful to keep a 'parking lot' list on the wall of issues that have been raised to be dealt with but are not yet in the programme. The facilitator can try to make room for these, or ask pairs of participants to meet outside the session to propose resolutions of the issues.
- Planning field trips for the workshop agenda strengthens learning and motivation. Participants indicate during evaluations that they enjoy field trips and that they change the atmosphere of the workshop. Most learning alliance members are active and visual learners and they like to see how things work on the ground. Travelling together to a site on the bus allows for increased interaction among participants. They laugh together at things they see on the road and this increases bonding.
- Be clear about when people can check emails, social networks and make Skype calls. The time for this is never during the workshop itself. Agree a set of rules for this and ensure that there are sufficient breaks for this to happen, or you will lose participants. The best rule is that laptops are closed during sessions (apart from the documenter) and that phones are off. You may need a tough enforcement policy to ensure that the rules apply to all. (You could ask the most senior person present to be a role-model and demonstrate that they are closing their laptop and turning off their phone.)
- Set up an evaluation method that is quick and easy and can be completed before people leave, since forms that are taken away are rarely returned. A board with headings and smiley and frowning faces can be a quick way for people to give feedback – make sure it is arranged so this can be done privately and discretely.

#### Facilitation methods

There are many facilitation methods and information on these methods is easily available on the internet (for instance <http://www.irc.nl/page/43952>). Most facilitators use a fairly limited number of tools mostly suiting their own experience and preferences. However, the selection of methods needs to be carefully considered and serve the specific purpose of a session. Using a variety of methods for different sessions will help keep a long workshop interesting and engaging. The table below gives a short overview of some facilitation methods.

#### Tips for workshop facilitation

This final section contains a number of tips for workshop facilitation.

- Start on time, the facilitator and facilitation team should be ready waiting for participants and to welcome them. Participants feel uncomfortable and begin to fidget if they have to sit and wait for the facilitators to get ready. They may lose interest in the workshop from the beginning. Develop a habit of the workshop starting and finishing on time.
- Thorough and detailed preparation is the key to the success of a workshop especially if the facilitators are not so experienced. Thorough preparation also helps the facilitator to be flexible – if you know your material well, it is easier to change or adapt it.
- Time management is very important for the workshop. Presentations should be short and crisp and should never overrun. Do not hesitate to ask people to stop discussions even if they want to carry on. Limiting discussions helps to retain energy and encourages interested people to continue during breaks and in the evenings. Allowing discussions to go on and on can throw the timing of the workshop out of shape.
- Group discussions are very important. Some people who do not speak in plenary sessions make good contributions in group sessions. Sometimes the confidence they gain from group discussion is translated to subsequent plenary sessions.
- PowerPoints should be used with care – they are perceived as top down and are less effective for learning than tools that actively involve workshop participants. However, PowerPoint presentations can still be an important tool for less experienced speakers, especially if used sparingly.
- Wherever possible keep presentations to an absolute maximum of 15 minutes (10 minutes is better) which means a maximum of 15 slides which are light on text.
- Sometimes, a picture really is worth a thousand words. Using pictures (in PowerPoint or any other programme) to tell a story can captivate the audience.
- If you invite someone from outside to present, make sure the objectives are clear to them and if possible, check presentations beforehand and discuss them with the presenter if they are too long or off the point.
- Sessions directly after a lunch break are generally a challenge for facilitators as energy levels tend to be low. It is up to the facilitator to energise the groups by planning a light session or introducing some nice energisers.
- The workshop room and the table setting strongly influence the workshop. Make sure that you check the room in advance. A spacious room with flexible table setting is preferable. Make sure that table setting avoids the impression of a class room and experiment with different settings during the workshop.
- Observing the reaction of the participants is very important. When facilitating read the body language of participants to see whether they are enjoying sessions or would like to move on to something else or want to close. Sometimes when workshops are spread over a long period; people may get tired and like to close early.

Table 3.13.2 A selection of workshop exercises and facilitation methods

	Short description	Strengths	Weaknesses	Remarks	References
<b>Buzz groups/brainstorms with meta planning</b>	Short brainstorm in groups of 2 or 3 followed by plenary discussion to analyse outcomes	Captures the 'wisdom' and experience of the group; works well as start of a discussion	Plenary analysis can be cumbersome when groups are big (too many cards)	Easy to organise and requires limited preparation	<a href="http://www.irc.nl/page/43952">http://www.irc.nl/page/43952</a>
<b>World Cafe</b>	Group discussions around predefined questions; participants are free to select a question that captures their interest	Serves as a good platform to exchange ideas in an open and informal atmosphere	Difficult to capture discussion; not so useful as an input for joint decision making		<a href="http://www.theworldcafe.com/">http://www.theworldcafe.com/</a>
<b>Open Space</b>	Gives participants the opportunity (space) to bring in topics and discuss them in a self-organising format	Powerful method that taps into the creativity and interest of participants;	Difficult to steer as the workshop is handed over to participants; reporting back is often difficult		<a href="http://www.openspaceworld.org/">http://www.openspaceworld.org/</a>
<b>Peer assist or Intervention</b>	'Real life' problems presented to peers for suggestions	Very powerful tool that also shows the value of listening to all participants	Requires participants who are willing to expose their feelings; does not work with peers in close contact with each other	Feedback can be done at two levels: content and process. Many people find it difficult to listen but do acknowledge the value.	<a href="http://www.kstoolkit.org/Peer+Assists">http://www.kstoolkit.org/Peer+Assists</a> or see a video on <a href="http://www.youtube.com/watch?v=ObmQyW3EiiE">http://www.youtube.com/watch?v=ObmQyW3EiiE</a>
<b>Talking stick</b>	Used by native Americans - only the person holding a 'sacred' object is allowed to talk	Forces people to listen to each other and brings a certain serenity into a group	Sometimes perceived as patronising and stops a free flowing discussion	The choice of object is important – for instance a beautiful flower is very powerful	<a href="http://facilitationpatterns.org/patterns/talking_stick">http://facilitationpatterns.org/patterns/talking_stick</a>
<b>Interviews</b>	Resource persons are interviewed by facilitator (or someone else) as an alternative to a presentation	Interesting alternative to presentation; creates a very different atmosphere in the group	Requires thorough preparation and strong interview skills	This can be made more interesting by interviewing two or more persons that present clearly different views or experiences	There is a growing recognition of storytelling as a facilitation and research methodology

### Related websites and further reading

Canadian Literacy and Learning Network: <http://www.literacy.ca/?q=literacy/literacyprofessionals/principles> [Accessed 29 April 2011].

The Facilitation Toolkit, IRC, 2007. Contains notes on facilitation, adult learning, cultural dimensions, capacity building, and a lot of detail on the design and conduct of training courses, and useful exercises. <http://www.irc.nl/page/43952> [Accessed 29 April 2011].

Knowledge Sharing Toolkit: A toolkit supported by the Consultative Group on International Agricultural Research (CGIAR), FAO, KM4Dev Community and the UNICEF. Contains a master list of (often facilitated) processes used with groups and individuals. Click on 'methods'. <http://www.kstoolkit.org/> [Accessed 29 April 2011]

Icebreakers: An explanation and list of icebreakers available in the Knowledge Sharing Facilitation Toolkit at <http://www.kstoolkit.org/Icebreakers> [Accessed 29 April 2011].

SWITCH transitioning manual: [www.switchurbanwater.eu](http://www.switchurbanwater.eu): This manual provides guidance on how to implement the SWITCH transitioning approach supported by examples from experiences in SWITCH cities. Four detailed case studies show how and why a transition is progressing in each city. Also included are transitioning toolkits based upon niche development in SWITCH cities. The manual is targeted at national and local level decision makers in the urban water sector including urban water practitioners and urban planners [Accessed 13 June 2011].

Managing the Transition of Urban Water Systems: SWITCH policy briefing note 4: [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP1-3\\_GEN\\_PBN\\_Managing\\_the\\_transition\\_of\\_urban\\_water\\_systems.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP1-3_GEN_PBN_Managing_the_transition_of_urban_water_systems.pdf). This policy briefing note summarises the SWITCH transition approach [Accessed 13 June 2011].

The Dutch Knowledge Network for System innovation and Transitions: [www.ksinetwork.nl](http://www.ksinetwork.nl). Provides resources on this new field of science where many researchers are working together to understand, identify and influence the process of transitions to a sustainable society [Accessed 13 June 2011].



# 3.14

Sewer pipes convey wastewater from Tel Aviv for treatment and then all the way to the Negev desert to irrigate crops, Israel.  
(Photo credit: Peter van der Steen)

## Transitioning urban water systems

Alison Duffy and Chris Jefferies

*Water managers acknowledge on a global scale that current practices are no longer sustainable and have an adverse impact on ecology (disruptions to the water cycle and habitats), public health (water qualities, sanitation services) and the economy (flooding, drought and overuse of resources). The idea of applying transitioning approaches stems from growing recognition that changes in water management are urgently needed. The SWITCH transitioning approach was developed by consolidating the project's existing stakeholder engagement approach with ideas on transition knowledge, an emerging new field of science.*

### Key concepts

<i>Transition</i>	A transition is a process by which societies select, adopt and implement new systems and methodologies that break with existing practice. SWITCH could be said to have been seeking a transition from current systems to sustainable urban water systems.
<i>Transition management</i>	Intelligent, long-term planning through small steps based on learning and experimenting.
<i>Strategic niche management</i>	The creation of protected spaces for experiments and learning involving stakeholders.

### Introduction

One example of a transition is the shift we have made from conventional mailing services to electronic mail; a development that has radically transformed the ways in which we now communicate. A transition does not necessarily imply the immediate uptake of new innovations, but is more commonly a process where societies select, adopt and implement new systems and methodologies that are radically different from existing systems.

Transition management is described by transition researchers as a form of intelligent, long-term planning through small steps based on learning and experimenting. Transitioning should be an interactive, reflective and iterative process where the flow of knowledge is multi-directional allowing for interaction between technology users, decision makers and managers.

Transitioning is necessary to achieve a more sustainable approach to urban water management. In the context of the SWITCH project a transition could be defined as ‘a radical switch from conventional socio-technical systems to next generation sustainable urban water systems’. The project can be considered a short-term global socio-technical transition experiment.

# SWITCH transitioning framework

Towards the end of the project, the SWITCH transitioning framework was developed to consolidate the project approach to promoting and facilitating change. The framework provides a re-conceptualisation of how to promote change in urban water management drawing upon the project’s learning alliance model of stakeholder engagement, practical experiences in cities and new scientific thinking in the field of transition knowledge. The SWITCH transitioning framework encourages a systemic approach that takes the entire water system into account; with sustainable and integrated design and operation of all water networks (natural systems, water supply, sanitation and stormwater) being the ultimate goal or vision. The transition process is cyclical and aims to integrate, replace and transform existing complex socio-technical systems that increasingly incorporate a more adaptive and flexible management approach to resources and urban water systems.

Figure 3.14.1 SWITCH transition framework

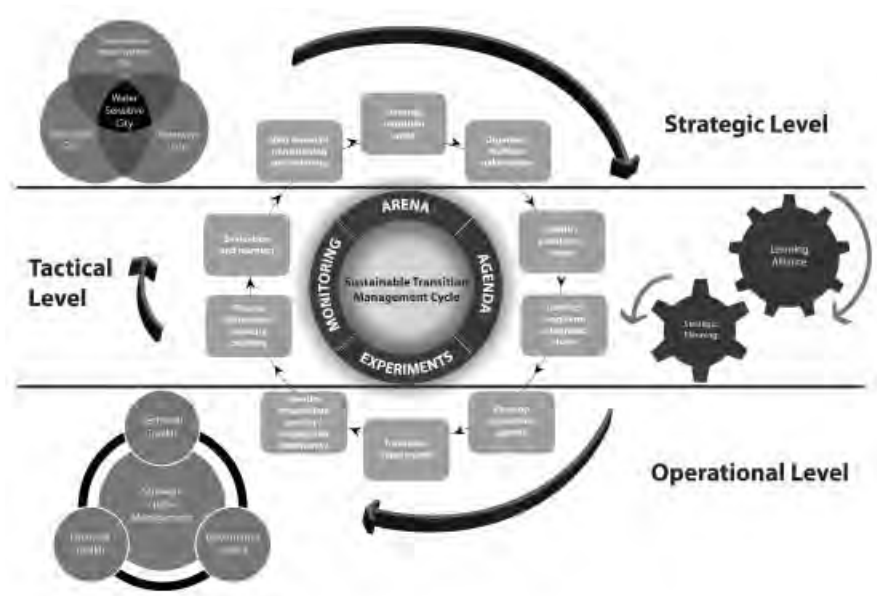


Figure 3.14.1 shows a transition management cycle consists of several steps that are aimed at influencing, organising and coordinating processes at three different governance or management levels (strategic, tactical, and operational). At the strategic level, visioning processes are developed, strategic discussions take place, long-term goals are formulated, collective goal and cultural norm setting is debated and long-term anticipation of innovative outcomes takes place. At the tactical level, short-term strategic goals of a vision are implemented and the transition agenda is developed. Societal sub-systems (the elements of the entire urban water system) are the focus at this level. At the operational level, short-term actions, experiments and innovation projects take place (Table 3.14.1). Developing and implementing new practices and methodologies generates niche environments for establishing new generation systems and improving the potential for scaling up. SWITCH learning alliances have operated in cities at all levels of this cycle, driving this process of change.

Different types of actors participate at each management level. A diverse set of competencies and skills are required across all levels. It is also necessary to acknowledge not only the influence of all actors on societal change processes but also to value the various perspectives and the diverse knowledge that can be used during all phases of the transition management process.

Table 3.14.1 Levels of activities in the transition management cycle (Loorbach 2007)

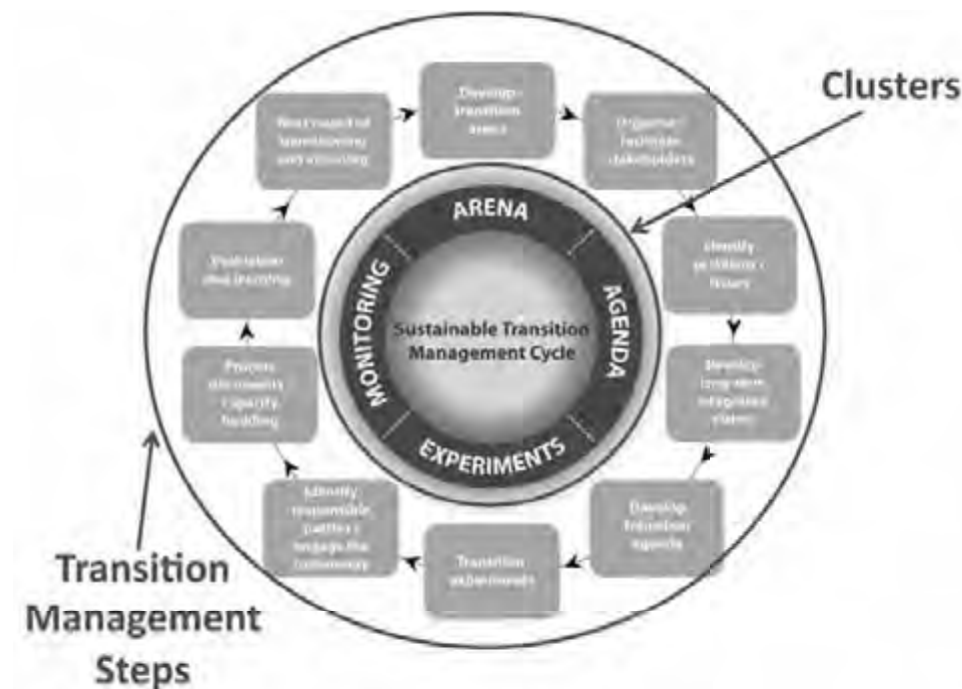
	Problem Level	Time Scale	Systems Level
Strategic	Abstract/societal system	Long-term (30 year)	System
Tactical	Institutions/regime	Mid-term (5-15 year)	Sub-system
Operational	Concrete/project	Short-term (0-5 year)	Niche/mini-system

The SWITCH transitioning framework considers the city’s learning alliance as the motor driving the transition management process. Transition clusters are the key tools of the transition management cycle (Figure 3.14.2). The four transition clusters are:

- 1. arena: establishing the transition arena and problem structuring;
- 2. agenda: developing the strategic plan and sustainable pathways;
- 3. experiments: initiating and implementing innovations; and
- 4. monitoring: evaluating, monitoring and learning close the loop and deliver the cyclical aspect of the process



Figure 3.14.2 Transition Management Clusters and Steps. Adopted and adapted from Grin et al 2010



**Box 3.14.1 Transition management steps that constitute cluster activities**

- Develop the transition arena
- Organise and facilitate stakeholders
- Identify water problems and issues
- Develop a long-term integrated vision
- Develop the transition agenda
- Experiment with transitioning
- Identify responsible parties, engage the community and brief the media
- Conduct capacity building/social learning activities/document the process of change
- Evaluate progress to benefit from 'learning by doing and doing by learning'
- Next round of transitioning and visioning

### Strategic niche management

Strategic niche management is the creation of technological niches where stakeholders such as the members of a learning alliance provide space for experiments such as environmentally sound practices. These should be aligned with future visions so that they can develop, mature and eventually become embedded into the existing regime. Many types of socio-technical transitions happen as a result of niche development (Loorbach, 2007).

### Using the transitioning framework

The SWITCH transition framework aims to be a 'road map' that is simple and easy to use. Its use is intended to facilitate a knowledge leap by communicating the pathways and tools available for encouraging the uptake of innovative practices and techniques that can guide or influence a transition towards the goal of more sustainable urban water systems. It can be used to better plan stakeholder engagement processes like those attempted by the SWITCH project.

Using the framework should encourage sector people to move away from conventional socio-technical urban water management pathways towards exploring pathways that offer more sustainable solutions. This should facilitate a mental shift encouraging the user to consider the possibilities of implementing next generation systems alongside conventional systems. The framework also focuses on learning, by applying a historically reflective, back-casting approach before looking forward to achieve long-term objectives. As new knowledge becomes available, re-evaluation and re-adjustment take place.

In SWITCH, the transition arena was called a learning alliance. Visioning and scenario-based strategic planning involved many aspects of the development of a transition agenda. Transition experiments refer to the science that was undertaken in the project and the demonstrations in cities involving learning alliances. Process documentation and city assessments in the project were key aspects of monitoring documentation of the change process, and helping learning alliance plan and re-plan their activities.

Transition management steps are the activities that define transition clusters (Box 3.14.1). In practice the transition management steps are likely to be carried out partially or completely, in sequence, in parallel or randomly. The methodology is not a prescriptive 'to-do list' and should not be followed as a step-by-step guide in the order provided in the transition manual.


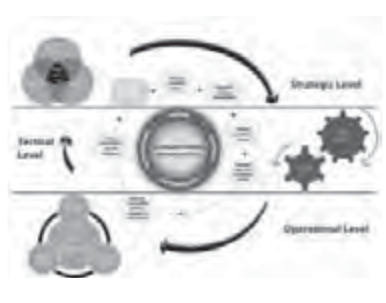
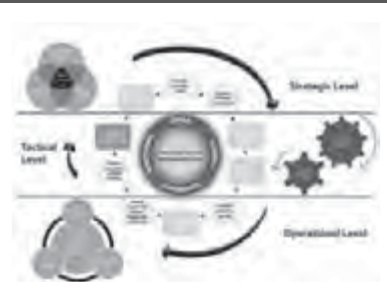
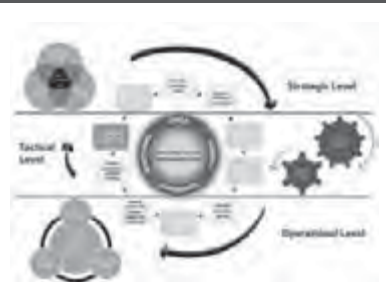
# Transitioning Stories from four SWITCH Cities

Four SWITCH cities (Accra, Alexandria, Belo Horizonte and Lodz) were used to examine historical transitions in urban water systems to their current status, looking at how these cities have attempted to transition urban water management practices during the project, and identifying to what extent this was actually influenced by the project and its approach. Transition management strengths for the four cities are highlighted in Figure 3.14.3. SWITCH was only a five year project and the transitioning strengths gained during this timescale surpassed expectations in most cases. Arguably, Accra gained the most from learning alliance activities during the project, although an integrated urban water management trajectory is yet to be realised. This was primarily due to the way in which activities in the transition arena were embraced by the stakeholders and the facilitation capabilities provided. Alexandria had many delays in setting up the arena and implementing experiments. This made it difficult for the members in the arena to realise transitioning strength potential in the timescale available. However a trajectory towards integrated urban water management solutions has potentially been developed.

Belo Horizonte has a strong future orientation and already, since the 1990s, has had an environmental trajectory which focuses on integrated catchment planning as a strategy for delivering integrated urban water management. The learning alliance was able to build on existing opportunities to move this agenda forward. An institutionalised arena has been developed with the addition of key stakeholders who have helped strengthen a transition research agenda. Skills for evaluation and learning, an important part of the transition management cycle, were not however fully developed as part of SWITCH. Lodz also had an existing research trajectory with its sights set on integrated urban water management. SWITCH introduced a package of measures that assisted in developing transitioning strengths which resulted in breaking down barriers by forming a learning alliance that was capable of putting this agenda firmly into the institutional and public domain.

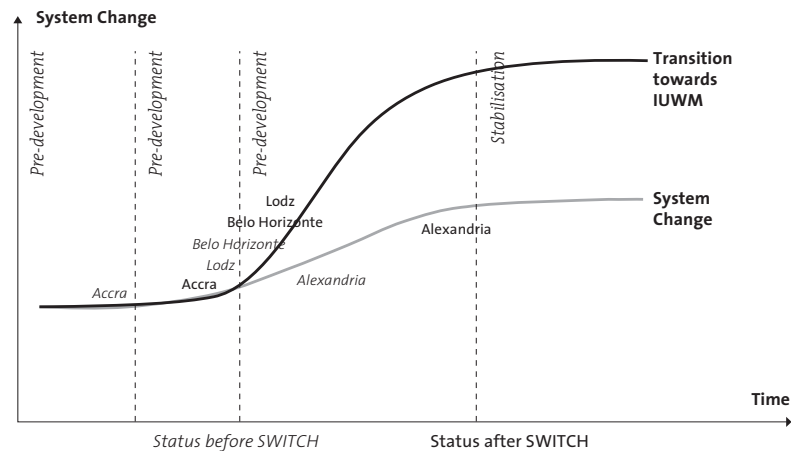
Significant movement along the ‘transition curve’ during the project was evident in all cities (Figure 3.14.4). Accra is posed to move into the take-off phase if the transition momentum instigated by SWITCH is sustained. Alexandria is technologically locked-in with culturally dominant stable infrastructures operated and managed by stakeholders who are rather resistant to change. However as a result of the strategic studies that were delivered through the project, stakeholders in the Alexandria city learning alliance have begun to realise just how unsustainable the water systems are in the light of additional pressures to which the city is likely to be exposed. The initiation of integrated strategies in Alexandria combined with a commitment to niche development through the proposed demonstrations is evidence of a desire to move towards more sustainable solutions. Both Accra and Alexandria have greatly benefitted from the transition strengths that they have gained during the project. The results of these processes has led to a clearer understanding of the issues (and costs related to these issues), barriers and constraints that they face as individual organisations and those which other stakeholders face as they attempt to improve their city for the future together; they are beginning to realise that together they can make a difference and reach the desired goal (a change in mindset is happening). Belo Horizonte and Lodz already had several strong transitioning strengths to build on and continue transitioning trajectories during the SWITCH project. Sustaining momentum is the biggest challenge for both cities.

Figure 3.14.3 Case Study Cities Transitioning Strengths gained during the SWITCH Project

Accra Transitioning Strengths	Alexandria Transitioning Strengths
 <ul style="list-style-type: none"><li>• Transition arena developed</li><li>• Key organisations and water issues identified</li><li>• Improving service delivery vision, scenarios and transition agenda developed. Strategies identified to improve water supply and sanitation services</li><li>• Responsible parties/stakeholders identified and media briefings to facilitate the vision and implement strategies</li><li>• Process documentation, evaluation methodologies and capacity building programme developed to facilitate transitioning process</li></ul> <p><b>NEXT round of transitioning should focus on</b></p> <ul style="list-style-type: none"><li>• further experimentation with innovations</li></ul>	 <ul style="list-style-type: none"><li>• Key organisations and water issues clarified and documented</li><li>• IUWM vision agreed with two further detailed visions for water supply and sanitation. Scenarios developed</li><li>• Process documentation developed, responsible parties identified and media briefings to raise stakeholder and public awareness</li></ul> <p><b>NEXT round of transitioning should focus on</b></p> <ul style="list-style-type: none"><li>• Finalising and delivering the transition agenda</li><li>• Implementation of transition experiments</li><li>• Developing monitoring and evaluation methodologies</li></ul>
Belo Horizonte Transitioning Strengths	Lodz Transitioning Strengths
 <ul style="list-style-type: none"><li>• Vision developed with a strong focus on IUWM</li><li>• Strong IUWM transition research agenda</li><li>• Responsible parties/stakeholders identified</li><li>• Strong media engagement encouraging ownership of innovative methodologies implemented</li><li>• Process documentation and capacity building programme strengthened</li></ul> <p><b>NEXT round of transitioning should focus on</b></p> <ul style="list-style-type: none"><li>• Continue up-scaling innovations across the city and other municipalities.</li><li>• Develop evaluation and learning methodologies</li></ul>	 <ul style="list-style-type: none"><li>• Transition arena strengthened with key players</li><li>• Strong vision and IUWM transition research agenda</li><li>• Transition agenda almost complete</li><li>• Responsible parties/stakeholders identified and media briefings to go forward with the vision</li><li>• Process documentation, capacity building, evaluation and learning programmes strengthened</li></ul> <p><b>NEXT round of transitioning should focus on</b></p> <ul style="list-style-type: none"><li>• Sustain up-scaling innovations across all rivers</li><li>• Complete IUWRM transition agenda</li></ul>

The transition trajectories are being driven by a more top-down approach in Accra and Alexandria and a more bottom-up approach in Belo Horizonte and Lodz.

Figure 3.14.4 Movement of SWITCH cities along the 'transition curve'



Progress in the case study cities was linked to the some key factors that strengthened the transition and strategic niche management processes:

- Full time learning alliance facilitation to organise stakeholders in the arena.
- Transition arenas with motivated champions who encouraged integration and generally led the group, helping to drive each stage of the process.
- A transition agenda that built on existing windows of opportunity (i.e. other projects and initiatives).
- Better progress where political buy-in and social inclusion were a part of the strategy.
- Active relationships nurtured between researchers and other stakeholders.
- Successful institutionalisation of the SWITCH approach at the regime level.
- Media involvement promoted to sustain the transition and pave the way for wider dissemination of the process to potentially facilitate scaling up within a city.

Some barriers to progress in the cities were identified as:

- Slow progress with overcoming challenges and barriers such as mobilising and motivating stakeholder collaboration.
- Delays to implementing research due to slow progress with initiating the transition arena and developing agendas.
- Lack of funding and activities that did not fit within the cultural norms of a city.
- Technological lock-in: Closed thinking inhibited the sharing of information and progress where infrastructure was firmly embedded and there was resistance to change by various sectors.
- Language barriers for effective global communication and knowledge transfer at the grass roots level.

## Summary

The SWITCH transitioning framework is a result of analysing transition management concepts and key processes within the SWITCH project, especially the learning alliances within cities. The transitioning manual provides a guide that can be used to help design processes in cities to move towards more sustainable urban water management practices. Transitions are structural changes that are usually long term processes that occur due to the co-evolution of several societal, economical and technological processes.

The SWITCH transition framework is not a deterministic tool that can predict the course of a transition, since there are so many fundamental uncertainties surrounding not just transitioning but the concept of sustainability itself. However it provides a tool to analysis the underlying driving forces and mechanisms behind the processes and actions that may guide or influence change. The SWITCH project has been a short-term global socio-technical transition experiment. It has attempted to guide and even accelerate the co-evolutionary and participatory processes required to move the cities towards transitioning their urban water planning and operational practices in a very short timescale in transitioning terms. There are very positive results from the cities which have embraced the learning alliance approach: this is testimony that the potential to influence a change towards more sustainable outcomes through transitioning principles is possible and that the learning alliance is a successful vehicle for facilitating an urban water paradigm shift.

Using the SWITCH learning alliance approach as a practical example of applying the transition management cycle and strategic niche management concepts, the transitioning framework can be used to focus any city, regardless of location or cultural norms, on sustainable transition end goals. It should help to identify and analyse transition strengths and weaknesses in any city that is attempting to manage its urban water systems in a better way.

## References

Grin, J., et al., 2010. *Transitions to sustainable development: New directions in the study of long term transformative change*. Knowledge Network on System Innovation and Sustainable Transitions. New York: Routledge.

Loorbach, D., 2007. *Transition management: New mode of governance for sustainable development*. PhD. Rotterdam: Erasmus University.

## Related websites and further reading

SWITCH transitioning manual [Online] [www.switchurbanwater.eu](http://www.switchurbanwater.eu). This manual provides guidance on how to implement the SWITCH transitioning approach supported by examples from experiences in SWITCH cities. Four detailed case studies show how and why a transition is progressing in each city. Also included are transitioning toolkits based upon niche development in SWITCH cities. The manual is targeted at national and local level decision makers in the urban water sector including urban water practitioners and urban planners.

Managing the Transition of Urban Water Systems: SWITCH policy briefing note 4 [http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP1-3\\_GEN\\_PBN\\_Managing\\_the\\_transition\\_of\\_urban\\_water\\_systems.pdf](http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP1-3_GEN_PBN_Managing_the_transition_of_urban_water_systems.pdf). This policy briefing note summarises the SWITCH transition approach.

The Dutch Knowledge Network for System innovation and Transitions [www.ksinetwork.nl](http://www.ksinetwork.nl) Provides resources on this new field of science where many researchers are working together to understand, identify and influence the process of transitions to a sustainable society.

[All websites accessed 13 June 2011]

**Adrienne Martin** is the Head of the Livelihoods and Institutions Group at the Natural Resources Institute and within the SWITCH project she focused on research on social inclusion. Email: a.m.martin@gre.ac.uk

**Alberto Galvis** coordinated the SWITCH project at the University of Valle and the learning alliance activities in Cali. He is a member of the Engineering Faculty at Cinara Institute and also a senior lecturer in Sanitary and Environmental Engineering and researcher in technology selection in water supply and pollution prevention and control. Email: alberto.galvis@correounivalle.edu.co

**Alison Duffy** is at the Urban Water Technology Centre, University of Abertay in Dundee, Scotland where she focuses on sustainable urban drainage systems. In SWITCH she worked on the development of the transitioning approach. Email: A.Duffy@abertay.ac.uk

**Alistair Sutherland** provided inputs on monitoring and evaluation and the documentation of the learning alliance process and analysis of changing perceptions of SWITCH consortium researchers and other stakeholders during the project. He is a Principal Research Officer at the Natural Resources Institute, UK. Recently, his work has focused on design and implementation of systems monitoring and evaluation, process documentation and assessment of early impact. Email: a.j.sutherland@gre.ac.uk

**Avi Aharoni** was the Tel Aviv City Coordinator, where he helped formulate a Final Report of Strategic Planning for the Urban Water Systems of Tel-Aviv-Yaffo. He was also the Project Manager of the research of Mekorot. Email: Aaharoni@MEKOROT.CO.IL

**Avital Dror-Ehre** facilitated SWITCH's activity of the "water club" - the learning alliance group in Tel-Aviv city. She finished her PhD which was multidisciplinary research combining nano-technology and water treatment, to face the challenge of controlling biofilm development by introducing silver nanoparticles in water. She is an expert in water and wastewater technologies. Email: avitald@raanana.muni.il or adror@agri.huji.ac.il

**Avner Adin** is a Professor at the Hebrew University of Jerusalem and was the lead project researcher working on SWITCH research in Tel Aviv.

**Bertha Darteh** worked with KNUST as the facilitator for the Accra Learning Alliance; coordinating with stakeholders and SWITCH researchers to develop strategic directions for IUWM in the city. She is currently finalising her research on the use of a learning alliance approach for innovation in water management at the University of Greenwich. Email: berthadarteh@yahoo.co.uk

**Björn Weber** coordinated the learning alliance in Hamburg. As a scientific officer at the Climate Service Center Germany he is working on stakeholder involvement processes to transfer scientific results to other sectors of society. His technical focus is on sustainability in general and mitigation and adaption towards changing environmental conditions in particular. Email: bjoern.weber@hzg.de

# Contributors to the SWITCH in the city book

**Cai Jianming** coordinated SWITCH demonstration site on rainwater harvest and urban agriculture development in Beijing. He is a professor at the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, located in Beijing, China. He is also the coordinator of RUAF China on urban agriculture and sustainable city development. Email: caijm@igsnr.ac.cn

**Carmen da Silva Wells** supported learning alliance teams to document progress and challenges and looked into the changing perceptions within the SWITCH consortium of applying a multi-stakeholder approach. She is a Programme Officer at the IRC International Water and Sanitation Centre, working on various programmes which focus on multi-stakeholder learning for change. Email: dasilvawells@irc.nl

**Cecilia Castro** advised on implementation of learning alliances and capacity building activities oriented to reuse of treated wastewater for SWITCH project in Lima, Peru. She works as Senior Project Officer and Regional Adviser at IPES Promocion del Desarrollo Sostenible working at various projects related to urban agriculture, water and sanitation and other environmental management topics in Peru and other Latin American countries. Email: mcecilia\_castro@yahoo.com or cecilia@ipes.org.pe

**Charles Batchelor** is a water resources management specialist and associate at the IRC International Water and Sanitation Centre. In SWITCH he supported several cities in developing scenario-based planning processes. Email: wrmltd@aol.com

**Chris Jeffries** is a Professor in Environmental Engineering at the University of Abertay in Dundee, Scotland and is head of the Urban Water Technology Centre. Email: C.Jeffries@abertay.ac.uk

**Colin Green** is a Professor of Water Economics at the Flood Hazard Research Centre at Middlesex University, London. In SWITCH he worked on governance issues preparing an overview report on governance a methodology for institutional mapping, guidelines for procedural equity, and inputs on how productive 'conversations' can be conducted between stakeholders and the scientific communities. Email: C.Green@mdx.ac.uk

**Deirdre Casella** is a Programme Officer at the IRC International Water and Sanitation Centre. She was involved in SWITCH in aspects of social inclusion research, development of activities in Alexandria and monitoring and evaluation approaches. Email: casella@irc.nl

**Diana Alexandra Zambrano** is a researcher at the Cinara institute in Cali, Colombia. Email: dialez2@yahoo.es

**Diana Paola Bernal** was involved in the SWITCH project in Cali, Colombia from 2007 to 2009. She worked in the diagnosis of water management for the city and supported the consolidation process of the Learning Alliances. She is a sanitary engineer of Cinara - Universidad del Valle and currently she is following her PhD studies at the same university. Email: dipabesu@univille.edu.co or dpaola22@hotmail.com

**Emanuele Lobina** is Principal Lecturer at the Public Services International Research Unit (PSIRU) of the Business School at University of Greenwich, UK. Emanuele researches and teaches water service reform and governance. He has been involved in several EU-funded projects such as Watertime, SWITCH, Govagua, the UNRISD-funded project on "Social Policy, Regulation and Private Sector Involvement in Water Supply. Email: e.lobina@gre.ac.uk

**Ewen Le Borgne** facilitated training courses and workshops around issues of process documentation, monitoring and learning and learning alliances. He is a Programme Officer at the IRC International Water and Sanitation Centre, working on knowledge management and multi-stakeholder learning for change. Email: leborgne@irc.nl

**Geoff Denham** was previously at Arup where he was involved in SWITCH managing inputs to support the Birmingham learning alliance.

**Gunther Merzthal** coordinated SWITCH's activities in Lima (Perú), while supervising and providing advice to the research, training and demonstration activities developed. He facilitated the national and local learning alliance created as part of SWITCH. He is a Programme Officer at the IPES Promocion del Desarrollo Sostenible located in Lima and at the International Network of Resource Centres in Urban Agriculture and Food Security (RUAF) located in Leusden (The Netherlands). Email: gunther@ipes.org.pe

**Haim Cikurel** is a Chemical and Environmental Engineer, with 38 years of expertise in research and engineering in municipal and industrial wastewater treatment technologies. He has been responsible for the scientific part in EU research projects since 1998 in Mekorot. In SWITCH he has been responsible for the short SAT –NF pilot and demo project and also a member of the Mekorot group who developed the 'water club' in Tel-Aviv and helped introduce water indicators in the strategic plan of the city. Email: hchikurel@mekorot.co.il

**Henrietta Orei-Tutu** is linked to KNUST in Kumasi, Ghana and in SWITCH supported activities in Accra.

**Iwona Wagner** is a Professor Assistant in the Department of Applied Ecology, University of Lodz, Deputy Director in the International Institute of Polish Academy of Sciences, European Regional Centre for Ecohydrology under the auspices of UNESCO. For several years she was the Secretary of the Ecohydrology Project of the UNESCO IHP, and a liaison for UNEP IETC. Iwona has been the City co-ordinator for Lodz in the SWITCH Project. Email: iwuwag@biol.uni.lodz.pl

**Jacqueline Hoyer** is a research associate at HafenCity University of Hamburg. She graduated in the field of landscape architecture and has worked for international research projects since 2007. In SWITCH she focused on research in the field of water sensitive urban design, notably on open space development as well as decentralised stormwater management. Email: jacqueline.hoyer@hcu-hamburg.de

**Javier Celma** is an Industrial Engineer with a Certificate in Environmental Engineering. He is the Director of the Environment and Sustainability of the Agency of Zaragoza City Council. Javier coordinated the SWITCH programme in Zaragoza. Email: [unidadambiente@zaragoza.es](mailto:unidadambiente@zaragoza.es)

**Jean de la Harpe** prepared the Alexandria city assessment. She is the Programme Co-ordinator for the Southern Africa Regional Team of the IRC International Water and Sanitation Centre and specializes in water sector policy, governance and institutional arrangements. Email: [harpe@irc.nl](mailto:harpe@irc.nl)

**Jennifer Chlebek** facilitated the Birmingham Learning Alliance which included liaising with industry and academia, future scenario/strategy planning and dissemination of SWITCH outputs to the wider community. Jennifer Chlebek is a water engineer at Arup and specialises in flood risk analysis. Email: [jennifer.chlebek@arup.com](mailto:jennifer.chlebek@arup.com)

**Jeroen Warner** is a political scientist, specialising in water issues. He published 'Stakeholder Platforms for Integrated Water Management', with Routledge in 2007. Jeroen currently works as Assistant Professor in Disaster Studies at Wageningen University and regularly cooperates with IRC. Email: [jeroen.warner@wur.nl](mailto:jeroen.warner@wur.nl)

**Ji Wenhua** is a facilitator of SWITCH-Beijing on rainwater harvesting and urban agriculture development. After graduating from the Institute of Geographic Sciences and Natural Resources Research (the Chinese Academy of Sciences), Ji Wenhua is now working as a teacher at Yun Nan Universtiy, located in Kunming, Yunnan Province, China. Email: [jiwh.07b@igsnr.ac.cn](mailto:jiwh.07b@igsnr.ac.cn)

**Jochen Eckart** facilitated the SWITCH learning alliance in the demonstration city of Hamburg. He is an Urban Planner by training and is interested in the integration of urban water management and other urban services in the city of the future. Currently, he is working as a graduate research assistant at the School of Global Sustainability at the University of South Florida in Tampa. Email: [jocheneckart@mail.usf.edu](mailto:jocheneckart@mail.usf.edu)

**Joep Verhagen** has an urban planning background and has been working on issues around water and sanitation services delivery for the poor in Asia and Africa for the last 15 years. Within SWITCH, his main focus was on Accra and Social Inclusion. Email: [verhagen@irc.nl](mailto:verhagen@irc.nl)

**John Butterworth** coordinated SWITCH's work on stakeholder engagement and provided backstopping support to the city teams. He is a Senior Programme Officer at the IRC International Water and Sanitation Centre located in The Hague, Netherlands but lives in and works from the city of Lodz, Poland. Email: [butterworth@irc.nl](mailto:butterworth@irc.nl)

**Khaled Abu-Zeid** was the Alexandria City Coordinator for SWITCH. He is the Team Leader for the preparation of the "Alexandria 2037 Integrated Urban Water Management (IUWM) Strategic Plan", and the Project Manager for the Alexandria Fishermen's Village IUWM demonstration project. Email: [kabuzeid@cedare.int](mailto:kabuzeid@cedare.int)

**Kim Andersson** is an environmental engineer who led the work in one of the research themes in the SWITCH Demonstration City of Cali, Colombia, for Cinara/Univalle. His specialty is sustainable sanitation with a focus on reuse. He is Swedish, and has many years of experience working with water and sanitation research and development projects in Latin America. Email: [kim.j.andersson@hotmail.com](mailto:kim.j.andersson@hotmail.com)

**Lama El Hatow** supported learning alliance activities in Alexandria, working for CEDARE in Cairo, Egypt.

**Laura Cecilia Osorio** is Mg in Environmental Management, and an Associate Professor of Environmental Studies at the IDEA-UNAL institute. Her line of research is about urban and municipal environmental management. She acted as the Director of the SWITCH project in UNAL from 2006. Email: [licosoriomu@gmail.com](mailto:licosoriomu@gmail.com)

**Marieke Adank** is a Programme Officer at IRC International Water and Sanitation Centre. She is based in the Netherlands, but can often be found in Accra, Ghana, working on different projects and initiatives within the framework of IRC's Ghana programme. Within the SWITCH project, her focus was therefore logically on supporting the work in Accra, providing support to the city team, especially related to the Learning Alliance process and the strategic planning process. Email: [adank@irc.nl](mailto:adank@irc.nl)

**Melissa Herrera Badel** is a Sanitary Engineer, who has been working in the application of SWITCH concepts in Cali, and has supported the learning alliances team. She is a member of Integrated Water Resources Management (IWRM) research group of CINARA-Universidad del Valle as Project Engineer, working in projects related to pollution control. Email: [meliheba@yahoo.com.ar](mailto:meliheba@yahoo.com.ar)

**Mike Morris** was involved in the initial promotion of the learning alliance concept and guidance on the setting up of the alliances. He is presently a Social Development Adviser with WWF-UK, and continues to advocate social learning approaches to addressing the problems that stem from the Earth becoming an increasingly human-dominated system. Email: [mikemorris\\_uk51@hotmail.com](mailto:mikemorris_uk51@hotmail.com)

**Mohamed Elrawady** is a Water Resources Specialist at CEDARE; he has over 9 years of experience in hydraulics, watershed management, coastal zone management, groundwater resources management, and numerical modeling. He is the SWITCH facilitator for the city of Alexandria. He has actively participated in the city's strategy studies and strategic planning. Email: [melrawady@cedare.int](mailto:melrawady@cedare.int)

**Monica Sanz** has been the leader of the SWITCH Project in Bogotá focusing on social inclusion, on the implementation of preventive strategies and conflict resolution approaches for underprivileged communities impacting with their activities the Bogotá River. She is a PhD student at UNESCO-IHE, The Netherlands. Email: [monicasanz@gmail.com](mailto:monicasanz@gmail.com)

**Monika Dziegielewska-Geitz** was the facilitator of the Lodz learning alliance and is a champion for the revitalization of the city. Email: [empower\\_consulting@yahoo.de](mailto:empower_consulting@yahoo.de)

**Nilo de Oliveira Nascimento** was the city coordinator of SWITCH in Belo Horizonte, Brazil. He is a Professor of Applied Hydrology at UFMG (Federal University of Minas Gerais) and his main research interests are in the fields of stormwater management, flood studies and use of economic instruments for water management in urban areas. Email: niloon@ehr.ufmg.br or niloon2000@yahoo.com.br

**Patrick Moriarty** is an engineer and water resource manager by background, with a strong interest in water governance issues. Since 2008 he has been based in Accra, Ghana, as director of IRC's Ghana programme. From there he has provided support to SWITCH in Accra, in particular the process of developing a widely shared strategic vision for the city based on a thorough understanding of the current situation of water resource use and water and sanitation service delivery. Email: moriarty@irc.nl

**Peter McIntyre** is a former newspaper journalist, now a writer, editor and trainer who works extensively in the water sector and also writes about health issues and ethical journalism. He likes to collaborate with content specialists so that their knowledge and insights become accessible to the widest possible audience. Email: petermcintyre@btconnect.com

**Philip Sharp** is an Independent Water Consultant and he carried out the role of City Coordinator for the Birmingham Learning Alliance for the first 3 years of SWITCH. Since 2009 Philip has been the International Facilitator for the Strategic Planning and Demonstrations in the City of Alexandria in Egypt. He also carried out City Assessments in Hamburg, Tel Aviv and Accra. Email: philip.sharp.uk@btinternet.com or Philipsharp@battusassociates.com

**Rae Mackay** coordinated development of the City Water Decision Support Tools for SWITCH and headed the research programme in Birmingham, UK. He is a Professor of Hydrogeology at the University of Birmingham. His research interests centre on modeling to improve the understanding of environmental systems. In May 2011 he will move to Monash University, Australia. Email: r.mackay@bham.ac.uk

**René van Veenhuizen** coordinated SWITCH's work on Productive Use of Urban Agriculture and provided backstopping support to the city teams in Accra, Beijing and Lima. He is a Senior Adviser on Urban Agriculture and Regional Food Systems at ETC AgriCulture located in Leusden, The Netherlands. René is also the Knowledge Manager of the RUAF Foundation, and the Editor of the Urban Agriculture Magazine. Email: r.van.veenhuizen@etcnl.nl

**Sônia Knauer** was the facilitator of SWITCH Project in Belo Horizonte, Brazil. She worked directly with the Learning Alliance's process, being responsible for establishing the partnerships and for organising all events and courses offered by Belo Horizonte SWITCH Team. She is the currently Water Resources Manager for the Environment Secretariat at Belo Horizonte Municipality. Email: knauer@pbh.gov.br

**Stef Smits** is a programme officer at the IRC International Water and Sanitation Centre, amongst others responsible for IRC's Latin America Regional Programme. He has mainly been involved with the SWITCH work in the cities in Latin America, supporting the city assessments in Cali and Belo Horizonte, where he also did research on governance. In addition, he supported the city assessment in Zaragoza. Email: smits@irc.nl

**Ton Schouten** supported the process documentation in SWITCH. His background is in communication and innovation sciences but he spent most of his professional career working as a documentary film maker. He is a senior programme officer at IRC. Currently he is the director of the Triple-S (Sustainable Services at Scale) project. Email: schouten@irc.nl

**Valerie Nelson** supported SWITCH social inclusion activities while at the Natural Resources Institute at the University of Greenwich. Email: valairn@ntlworld.com

**Victor Bueno Bernal** has a Bachelor of Chemical Sciences, and is part of the Environment and Sustainability Agency of Zaragoza City Council. He is the Vice-Coordinator of the SWITCH programme in Zaragoza. Email: vbueno@zaragoza.es







# SWITCH in the city

putting urban water management to the test

*With more than half the planet's population living in urban areas, and rapid growth predicted, cities present a daunting test in water management. Their scale and concentrated populations provide a special challenge in providing water and sanitation services, creating a safe and pleasant environment, and handling wastes. As sustainability concerns have risen up the agenda, the challenge is for cities to do more, with less. To provide better services to all citizens, with less negative and more positive environment impacts on cities and their rural hinterlands.*

The SWITCH project was a five year experiment focused on some of the key sustainability challenges in urban water management. In a number of cities around the globe, it set out to test what was needed for a transition to more sustainable urban water management through a combination of demand-led research, demonstration activities, multi-stakeholder learning and associated training and capacity building.

The book brings together the experiences of 12 cities involved in the SWITCH project from four continents (Accra, Alexandria, Beijing, Belo Horizonte, Birmingham, Bogotá, Cali, Hamburg, Lima, Lodz, Tel Aviv and Zaragoza) with a set of guidelines focused on promoting stakeholder engagement in such processes. It is targeted at people interested in undertaking demand-led research, promoting multi-stakeholder engagement, and scaling up research impacts, not only in urban water management but also in other areas where we find such complex and 'wicked' problems.

