



WORKING PAPER November 2014

Towards systemic change in urban sanitation

Giacomo Galli

At IRC, we believe that turning on a working tap should not be a surprise or cause for celebration.

We believe in a world where water, sanitation and hygiene services are fundamental utilities that everyone is able to take for granted. For good.

We face a complex challenge. Every year, thousands of projects within and beyond the WASH sector fail – the result of short-term targets and interventions, at the cost of long-term service solutions.

This leaves around a third of the world's poorest people without access to the most basic of human rights, and leads directly to economic, social and health problems on a global scale. IRC exists to continually challenge and shape the established practices of the WASH sector.

Through collaboration and the active application of our expertise, we work with governments, service providers and international organisations to deliver systems and services that are truly built to last.

© 2014, IRC

Permission is hereby granted for sharing and adaptation of this material, in whole or in part, for non-commercial use, educational, scientific or development-related purposes, provided that the appropriate and full citation is given. This publication is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Netherlands License. View terms of license here: <http://creativecommons.org/licenses/by-nc-sa/3.0/nl/deed.en>

This working paper is a product of an IRC trainee programme in 2014, with the supervision of Erick Baetings. It features ongoing discussion and debates on urban sanitation within IRC and between IRC and its development/country partners. For feedback, or to contribute to ongoing debate, contact this paper's author, Giacomo Galli, at galli@ircwash.org or IRC's Sanitation Programme Lead, Christophe Nothomb, at nothomb@ircwash.org.

Special thanks go to Marielle Snel, Alana Potter, Carmen da Silva Wells, Amélie Dubé, Mélanie Carrasco and Deirdre Casella for their contributions to the finalisation of this paper.

The editorial and production process of this publication was managed by Anjani Abella. All diagrams found in this paper are the work and elaboration of the author, unless otherwise stated.

Reviewers: Catarina Fonseca, Christophe Nothomb and Elisabeth Kvarnström

Editors: Minnie Hildebrand and Anjani Abella

Design and Layout: Punt Grafisch Ontwerp, Utrecht, The Netherlands

All IRC publications are accessible through the IRC website for free download. Visit www.ircwash.org or send a request to IRC's online contact form at www.ircwash.org/contact-us.

Cite this publication as follows:

Galli, G., 2014. *Towards systemic change in urban sanitation*. (IRC Working Paper) The Hague: IRC.

Towards systemic change in urban sanitation

Contents

EXECUTIVE SUMMARY	6
Sector challenges in a nutshell	6
From infrastructure to service delivery	7
1 THE CORE CONCEPTS FOR A ‘WHOLE-SYSTEM APPROACH’ IN URBAN SANITATION	10
1.1 The sanitation chain	11
1.2 Different service levels	12
1.3 Mapping institutions	12
1.4 Government in the lead	13
1.5 Monitoring sustainable service delivery	14
1.6 Overview: the five core concepts for a whole system change in urban sanitation	15
2 CHALLENGES TO OVERCOME IN THE URBAN SANITATION SECTOR	16
2.1 Financial issues.....	17
2.2 Institutional barriers	18
2.3 Environmental aspects	19
2.4 Technical considerations.....	20
2.5 Social issues around sanitation.....	22
2.6 Overview: major challenges in urban sanitation	23
3 OUTLINING THE PROCESS OF CHANGE TOWARDS A ‘WHOLE-SYSTEM APPROACH’ IN THE URBAN SANITATION SECTOR	24
3.1 Phase 1: Initiating the change	25
3.2 Phase 2: Learning and testing	26
3.3 Phase 3: Replicating and scaling up	27
4 CONCLUSION AND WAYS FORWARD	28
4.1 Initiating the change	28
4.2 Learning and testing	28
4.3 Replicating and scale	29
5 REFERENCES	30
ANNEX 1: OVERVIEW OF AVAILABLE SANITATION PLANNING APPROACHES	34

TABLES

Table 1: Major challenges in urban sanitation.....	16
Table 2: Investment data: Urban sanitation	17
Table 3: Overview of available sanitation planning approaches.....	34

FIGURES

Figure 1: The desired change in urban sanitation	7
Figure 2: The core concepts for a 'whole-system approach' in urban sanitation	10
Figure 3: WASHCost composite indicators to assess overall sanitation service level	12
Figure 4: Theory of change for urban sanitation sector reform	24
Figure 5: The five core concepts and accompanying tools.....	26

BOXES

Box 1: Key functions of government relevant to sanitation.....	14
Box 2: Sustainability Principles (FIETS).....	16
Box 3: Governance of urban sanitation in Latin America.....	18
Box 4: Environmental pollution in two Asian towns	29

ILLUSTRATIONS

Illustration 1: Faecal waste flows in Dhaka, Bangladesh.....	11
Illustration 2: Trends in improved sanitation coverage in informal settlements in Mombasa, Kenya....	22

Executive summary

With the expiration of the Millennium Development Goals (MDGs) around the corner in 2015, the lack of access to improved sanitation facilities for 2.5 billion people continues to present a colossal global problem (WHO/UNICEF, 2014). In a world where the urbanisation rate is increasing, the concomitant demand for sanitation facilities is pertinently aggravating existent social and infrastructural difficulties and is gaining importance (ibid) and demanding the attention of the international development community (Hawkins, et al., 2013).

Approximately 756 million urban dwellers worldwide lack access to improved sanitation, according to the JMP (WHO/UNICEF, 2014).¹ This number is likely underestimated as many sanitation facilities do not comply with the definition of improved, safe or sustainable facilities (Jenkins, et al., 2014). Why there is such a huge sanitation problem is both complex and simple. It starts with the way that provision has been seen: basically through technological spectacles, and in the past decade exacerbated by the pressure to attain the MDGs. The problem is compounded by a limited focus on containment of faecal matter – largely considered a household responsibility, with little consideration to the resultant increasing environmental exposure in cities (Baum, et al., 2013; WSP, 2014). The rapid expansion of small- and medium-size towns in low- and middle-income countries, as well as the high, and unplanned growth of informal settlements in large cities, make urban sanitation an urgent topic to engage with in order to reduce public health risks and protect the environment.

Change is imperative in the urban sanitation sector. Current models have not been delivering the services they are supposed to deliver and at the scale that is urgently required. Sanitation services that revolve mainly around networked systems (such as reticulated sewerage) (Trémolet and Binder, 2013) serve only a small and more affluent sector of society in bigger towns and cities in low- and middle-income countries. Serviced on-site systems, used by most of the people in urban settings (such as pit toilets, septic tanks, composting systems or holding tanks) are either not properly serviced or the effluent is mostly left untreated and disposed of into the environment (UNEP, et al., 2010; Baum, et al., 2013). Toilet facilities are insufficient in most cities, especially in the poor and densely-populated areas (UN-HABITAT, 2010). Where rudimentary sanitation systems exist, effluent is discharged directly into open drains (The World Bank and AusAid, 2013; WSP, 2014). Faecal sludge that is collected from on-site systems is often dumped, or sold directly to farmers without any treatment whatsoever (Verhagen, et al., 2012). Stormwater drains, which are filled with human and solid waste, stop functioning properly, and frequently contribute to flooding and contamination. To solve these problems is complex as they are not singular technical problems. A solution that considers its complex interconnected social, financial, environmental and institutional nature is therefore required.

SECTOR CHALLENGES IN A NUTSHELL

The factors contributing to these sanitation problems are numerous and varied. For instance, where government leadership is weak, the negative spin-off is low political commitment that leads to chronic budgetary shortages and a very low pledge of public funds for sanitation. However, when funds are available, little is directed to improve the management of the government's service delivery (WHO, 2012). Furthermore, the institutions charged with sanitation service delivery are typically mandated to deliver these services through sewerage systems, while the mandate for users of on-site systems is normally the responsibility of municipalities. The problems are compounded by insufficient regulatory frameworks, non-existent expansion of sewerage networks to poorer areas, and the ineffective enforcement of environmental transgressions: polluting activities such as dumping of faecal sludge are rarely, if ever, fined. Furthermore, sanitation is seen by many in the sector as a household responsibility and not a public concern, and there is little oversight and harmonisation of all stakeholders involved in the urban sanitation sector (Welle, et al., 2008). In the event that all these challenges are addressed, a critical shortfall that will emerge is the unavailability of qualified personnel to carry out all the work. Again, as all these factors are interconnected and integrated, it shows that there is a systemic failure at hand which cannot be solved by piece-meal solutions (see for instance a case in South Africa, Eales, 2008) or through a narrow-banded project approach.

¹ The data gathered by the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation considers access to 'improved' sanitary facilities (WHO/UNICEF, 2014).

FROM INFRASTRUCTURE TO SERVICE DELIVERY

The 'whole-system approach', promoted in this document, revolves around the idea that systems are best understood in the context of how these parts and people form relationships with each other and with other systems and not as the working of individual and independent components. The application of a 'whole-system approach' to sanitation is a relatively new concept, at least in theory. While organisations in the sector have supported the delivery of urban sanitation as an integrated service, in practice, many of the delivery systems are still project based and the real picture that emerges is still projects for developing technologies. Many projects focus on specific components of the sanitation chain (for instance on containment only or transport) or projects for creating demand for facilities. The desired result of the 'whole-system approach' is for the sanitation sector to move to a reality where government leads in its own transformation and encourage changes in sector stakeholder approaches, to ensure that sustainable urban sanitation services are provided with the obvious concomitant health and welfare spin-offs (Figure 1).



FIGURE 1 THE DESIRED CHANGE IN URBAN SANITATION

Vision for the sector

A 'whole-system approach' is IRC's vision of change for the sector, as much as it is an approach that informs the way the organisation works. It is a challenge to move away from working in a manner where most sanitation development projects exist alongside each other, with little or no support going to overseeing institutions, and where any one single organisation only sees one part of the puzzle. The objective of this document is therefore to outline what the 'whole-system approach' means for urban sanitation and what steps are needed to get there.

The sanitation delivery chain

The 'whole-system approach' hinges on the articulation between different frameworks and components in the sanitation delivery chain. Sanitation-related challenges can only be addressed through a process of systemic change, which puts the national sanitation service authority at the centre of this reform process; both as its main driver of change, and also as one of the key organisations that will transform itself through this process.

The different frameworks in the sanitation delivery chain underpinning the 'whole-system approach' consists of five core concepts being: 1) the realisation that sanitation consists of a chain of activities, which include containment, collection, transport, treatment and safe disposal or reuse; 2) sanitation is a question of service provision not infrastructure only, and needs to be assessed and monitored as such; 3) there are numerous actors in the sector, each with their own roles and responsibilities; and the different actors (the service authority, service provider and users) need to collaborate to fulfil their tasks in a cooperative manner; 4) the national service authority should be the driver of the change process; and 5) the monitoring of services as well as the performance of all service providers and authorities are essential for continuous improvement of the sector.

Dimensions of sustainability

In the 'whole-system approach', five dimensions of sustainability are used by the Dutch WASH Alliance, being: financial, institutional, environmental, technical and social (FIETS). Combined, all five make up a framework to analyse the challenges occurring in the urban sanitation sector. Major issues are found across all of these domains, indicating the need for a sector reform that considers multiple dimensions of sanitation service delivery. This reveals that change will not occur through the introduction of a certain technology or with a single new approach; the entire system needs to be transformed.

Phased approach and learnt collaboration

The process of systemic change in the urban sanitation sector is outlined through three distinct phases: initiation, learning and testing and institutionalising change. The outcome objective of this process is to move towards a government-led urban sanitation sector that is motivated, is able to learn, and continuously improves itself.

This phased approach originated as a response to emerging insights about the complexity of the water and sanitation sector. This led IRC to the development of learning alliances as an approach from the early 2000s onwards. Learning alliances shifted the focus from single solutions towards engaging stakeholders in shared search for solutions through joint diagnosis and visioning of the future, followed by identifying, testing and institutionalising solutions. These three phases hinge on the importance of actively involving a range of different stakeholders throughout the process: first during the problem definition, analysis, and visioning; second with a focus on doing, by experimenting with the alliance partners in the messy real world; and third by bringing the experiences gained back to the policy table (Casella and da Silva Wells, 2014; Smits, et al., 2007). For a similar approach in urban sanitation the following process is envisioned:

- **In the first phase** rapid assessments are carried out using tools pertaining to the five core concepts of a sanitation delivery chain. This will culminate in an urban sanitation vision and accordingly to better focused municipal sanitation planning.
- **The second phase** includes capacity development of key organisations and experimenting and learning through Learning Alliances in order to address the problems in urban sanitation.
- **The last phase** is one where the national sanitation authority is able to institutionalise and replicate successful experiments without external support.

The way forward for this 'whole-system approach' is to start promoting this concept to specific target audiences, such as: actors in the WASH sector, funding agencies and most importantly – local government organisations. This will require engaging with a network of actors to find support for the approach. One of the most important actors to engage with is a 'champion' organisation that can drive such a process of systemic change, such as a service provider.

In the Executive Summary, the need for a 'whole-system approach' in urban sanitation was summarised. In the following chapters, the core concepts for the approach will be described (Chapter 2), followed by an examination of the major challenges that accompany efforts to reform in the urban sanitation sector in low- and middle-income countries (Chapter 3). This working paper concludes with an outline of a change process that can lead to a model that supports sustainable and equitable urban sanitation services (Chapter 4).



Aerial view of Worli, Mumbai (Photo by Giacomo Galli/IRC).

1 The core concepts for a ‘whole-system approach’ in urban sanitation

Urban sanitation has many facets, ranging from technological to social and institutional. In fact, urban sanitation provision is a service, not a technology. For this service to be functional, a large range of stakeholders, organisations, technologies and enterprises need to be aligned. The people that maintain a toilet block or unclog a drain are equally as important as the environmental laws and regulations that need to be in place to deter indiscriminate dumping of waste in the open environment. All the actors and institutions involved in urban sanitation operate at different levels and scales, ranging from the (inter)national to the household level. Decision-making does not occur centrally, but across all levels; all decisions taken are interconnected and influence each other. It can therefore be stated that urban sanitation provision is a complex socio-technical system (Geels, 2006; van Vliet, et al., 2011) and that urban sanitation problems are of a systemic nature. As these issues concern an entire city and are linked to national institutions and regulations, they cannot be solved through uncoordinated action focusing for example, on the reform of a single organisation or one component of the provision system. In order to seriously improve overall service delivery, the systemic causes, which lie at the heart of these problems, need to be tackled first.

This incremental understanding inspired IRC to develop Triple-S (Sustainable Services at Scale), a six-year, multi-country learning initiative to improve water supply to the rural poor. This initiative is currently operating in Ghana and Uganda, and aims to achieve systemic change in the rural water supply sector. Based on Schouten and Moriarty (2013), such a systemic change is possible by:

- Implementing a ‘service delivery approach’ to rural water supply, delivering water services that pays attention to long-term sustainability and post-construction support.

- Nurturing a learning and self-sustaining capacity within the water sector at district level.
- Improving the harmonisation and coordination mechanisms within government-led processes, offering a template for stakeholders and development partners to follow the same rules and work towards the same goals.

This working paper applies some of the lessons learnt in Triple-S and outlines a practical approach to effect a ‘whole-system change’ in urban sanitation. Building on previous work carried out by IRC and other sector organisations, analysis in this paper is grounded by the following premises, or otherwise referred to as ‘core concepts’:

- A sanitation service consists of a chain dealing with safe containment, collection, transport, treatment and disposal/reuse of human waste. All these elements need to be in place, and they need to be in place for everyone.
- Sanitation is about service delivery, not solely about infrastructure provision. The level of a sanitation service is assessed – at a minimum – in terms of its accessibility, use, reliability and environmental protection.
- A sanitation service consists of a complex interaction between actors, institutions and physical infrastructure that operates at and across various governance levels.
- A process of systemic change relies on strong government leadership from the very start; external actors should refrain from taking over (or by-passing) this task. Part of the challenge will be to nurture and develop this leadership.
- Sanitation services and the performance of the sector need to be monitored for continuous improvement.



FIGURE 2 THE CORE CONCEPTS FOR A ‘WHOLE-SYSTEM APPROACH’ IN URBAN SANITATION

1.1 THE SANITATION CHAIN

A sanitation service comprises five elements, namely:

1. containment
2. collection
3. transport
4. treatment
5. disposal or reuse (Von Münch, 2008).

The environmental burden and health risks associated with lack of sanitation facilities can occur if any one of the links in this chain malfunctions, or is left out.^{2,3}

Just like a physical chain, the sanitation chain is as strong as its weakest link: if failure occurs in one part of the chain, the entire chain will be non-functional. This is illustrated in the case of Dhaka, Bangladesh in Illustration 1: despite that 99% of the faecal waste flows of Dhaka's 16 million inhabitants are safely contained, 98% is still unsafely disposed (WSP, 2014). This means that the health risks and environmental burden associated with this faecal matter will not be reduced, but merely shifted. These findings imply that advancements in addressing latrine adoption are futile if the whole sanitation chain is not taken into account. In fact, most of all faecal matter 'disappears' on-site, leaking into open drains or in groundwater.

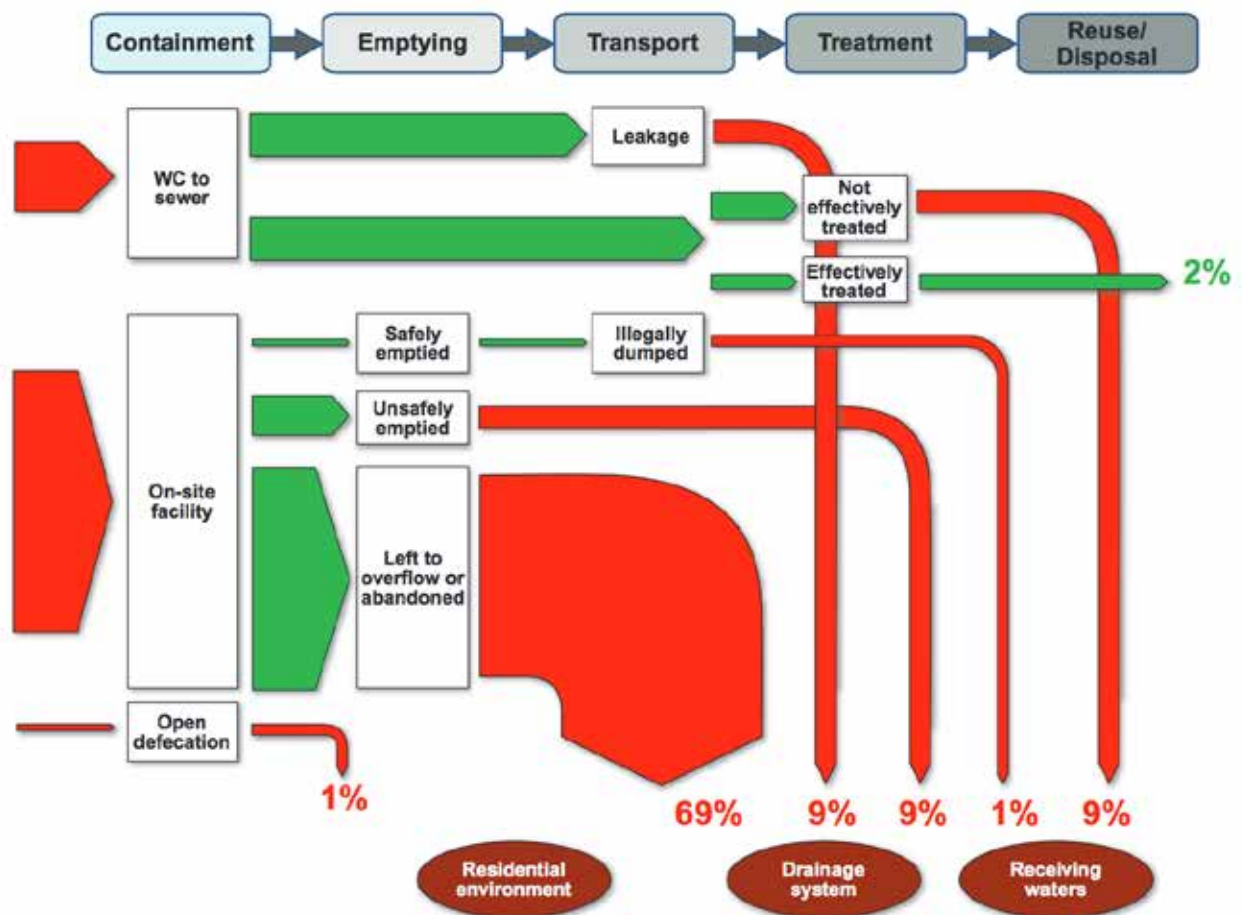


ILLUSTRATION 1 FAECAL WASTE FLOWS IN DHAKA, BANGLADESH

Source: WSP, 2014, p.3.

² For more information on sustainable sanitation, visit the Sustainable Sanitation Alliance website (www.susana.org).

³ Two interesting workshops on sustainable sanitation that IRC co-organised are the 'West Africa Learning and Exchange Workshop: Towards sustainable total sanitation' in Cotonou, Benin, 12-14 November 2013 (see www.ircwash.org/sites/default/files/benin_workshop_report_final_version.pdf) and 'Unclogging the Blockages: Sanitation Conference' in Kampala, Uganda, 18-20 February 2014 (see also <http://unclogit.blogspot.nl/>).

1.2 DIFFERENT SERVICE LEVELS

Confirming that sanitation consists of a chain of activities, it becomes clear that sanitation improvement is more than meeting a technical objective (for instance the construction of toilets) and/or reaching behavioural targets (such as eliminating open defecation). Ultimately, a safe, hygienic and improved sanitation service should ensure health benefits, environmental protection (WHO/UNICEF, 2014) and take into account notions of privacy and dignity (de Albuquerque, 2014; COHRE, et al., 2008). This service should comprise all parts of the sanitation chain and should be assessed as such. However, understanding sanitation as a service has

been obscured by an overall emphasis on meeting and monitoring sanitation infrastructure and/or behavioural targets specified in MDG target 7c. This resulted in an over-focus on the first step of the sanitation chain (containment) and neglected the importance of the steps following thereafter (collection, transport, treatment and safe disposal/reuse) (Mulumba, et al., 2014). A sanitation service level assessment framework (Potter et al. 2011) was developed with this in mind, offering a framework that uses four composite indicators to assess sanitation service levels, on the basis of which a sanitation service level is determined (see Figure 3):

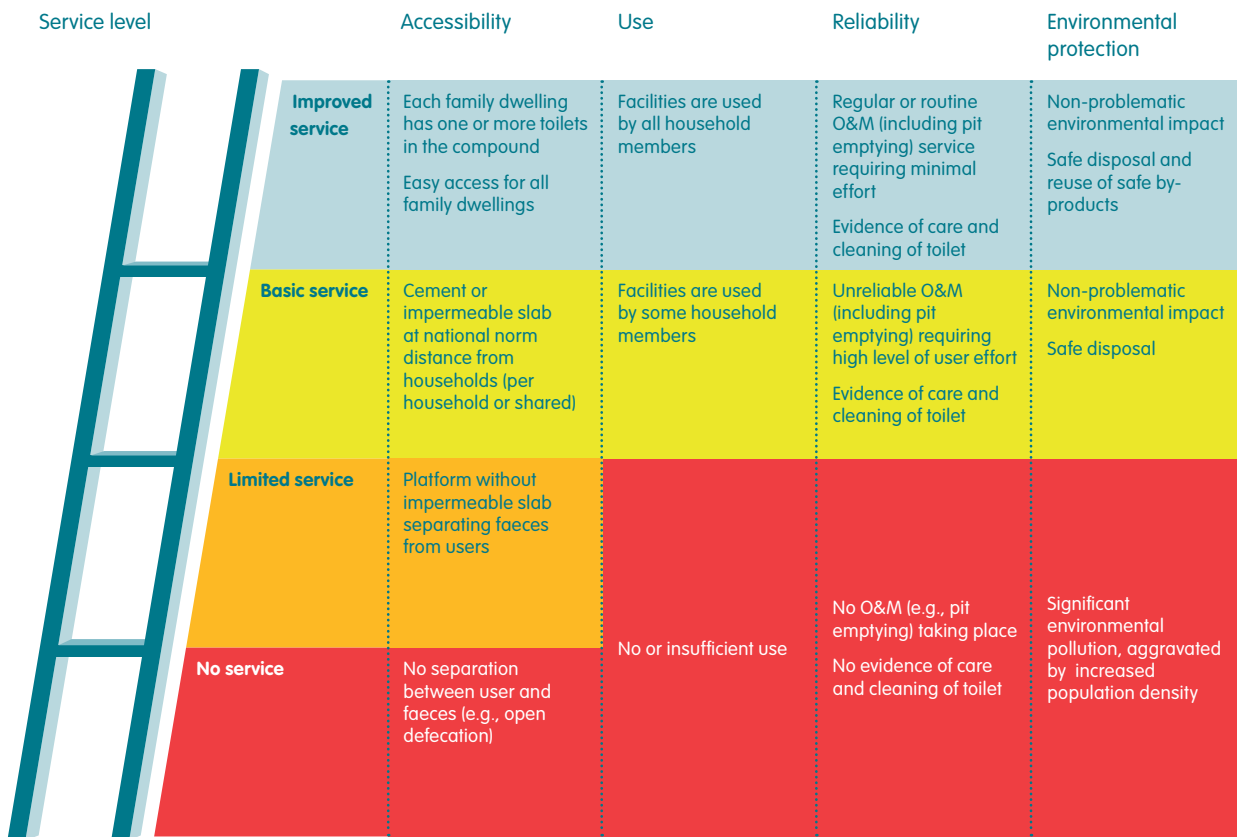


FIGURE 3 WASHCOST COMPOSITE INDICATORS TO ASSESS OVERALL SANITATION SERVICE LEVEL
Source: Potter, et al., 2011, p.21.

Further work needs to be carried out to develop similar service levels that consider the inter-related nature of stormwater drainage, solid waste collection, and the containment, transport and treatment of human waste. These linkages are especially important in urban environments (see also Chapter 2.3.3 of this paper).

1.3 MAPPING INSTITUTIONS

Urban sanitation in its most basic institutional form will consist of three stakeholders: a user, an operator and a regulator. These interact with each other through a series of interconnected technologies, for instance a toilet, a sewer and a treatment facility. An underpinning assumption (and presently, a contributing factor to the urban sanitation

challenge) is that appropriately trained staff is available to service the sector. Research has shown that the human resources issue in sanitation provision is severely lacking in most low- and middle-income countries.

The three stakeholder groups are interconnected through technologies, flows of information, finance and human waste. A sanitation chain will consist of a diverse range of operators, technologies and legislations: from poor to rich households, schools to businesses, and municipal sanitation utility and various informal operators; to legislative and regulatory mechanisms that safeguard the environment and health, and regulate building requirements. The different tiers of government tasked with sanitation provision, that range from household to national government level – also known as ‘multi-level governance’ (Ekane, et al., 2014), adds to the complexity.

Understanding this complex system is one of the first steps to effect change. A mapping exercise that examines the wide-ranging actors in a system, funding and information flows and decisions-making practices will deepen the understanding of an urban sanitation system. Such a mapping exercise becomes more effective when carried out with key sector stakeholders to ensure that the reading of a sector’s landscape reflects informal arrangements and daily practices.

1.4 GOVERNMENT IN THE LEAD

Linked to above, clarifying the roles and responsibilities of the different stakeholders within an urban sanitation system is imperative. Notwithstanding variation in governance structures and resource availability, in most cases, the following stakeholders – with their concomitant roles and responsibilities – are found:

- **Regulatory body:** National government is normally tasked with this role, after which the next levels of government, being provincial/district and municipal, are tasked with enforcing legislation and regulations within their area of jurisdiction. Ideally, this role also includes activities and regulations that stimulate planning and monitoring of sanitation systems at local level.
- **Service provider(s)/operator(s):** Are those that provide the operational, maintenance and repair activities of a sanitation system. This role can be either carried out by a public or private organisation, which can be one operator that deals

with centralised, on-site and off-site systems. But in most cities the formal municipal operator will have a mandate to deliver services based on sewerage infrastructure. In many countries the removal of sludge from sewerage tanks (on-site) or other containers are done by private contractors and not by the municipality. In many instances this is not regulated, which creates additional challenges. Operators at municipal level can also be subsidiaries of national water and sanitation utilities (Sugden, 2013; Opel and Bashar, 2013; Tayler, et al., 2013).

- **Users:** All human beings are users of a sanitation system and may interact through a household latrine, public toilets, or shared facilities in a building: such as a school or workplace. Operational, maintenance and repair responsibilities will differ according to each of these locations.
- **Suppliers:** A well-functioning supply chain needs to be in place in order for all persons and organisations involved in the sanitation provision – be it households needing materials to build a latrine, or operators and providers needing spare parts to carry out their work and credit to invest in their operations.

Other actors such as NGOs, CBOs, environmental groups, trade unions and consultants also play a role in an urban sanitation system. Their roles are often classified as a supporter to other organisations, or as a watchdog.

In order to move towards a fully functioning system for all inhabitants of a city, there is a need to understand the specific roles played by each actor within a system (Sutherland, et al., 2012; Smits, et al., 2007; Mulumba, et al., 2014). However, for all actors to collaborate and move in a coordinated manner, it helps to assign the leading role (or otherwise referred to as the ‘champion’) to one specific organisation. This leading function is ideally fulfilled by a governmental agency. Champion responsibilities will range from, among others, the assessment, planning and monitoring of urban sanitation services. Other champion-related tasks are found in Box 1.

BOX I KEY FUNCTIONS OF GOVERNMENT RELEVANT TO SANITATION

Policies and bylaws: Takes leadership and fosters inter-sectoral collaboration to create an enabling policy and regulatory framework for equitable service delivery and partnerships that provides linkages and incentives throughout the sanitation chain – from demand to supply and ongoing service provision.

Planning: Ensures integrated spatial sanitation planning at a scale that enables both sanitation business development and effective governance.

Finance: Ensures financing mechanisms are in place to cover life-cycle costs that complement microfinance potentialities and other private sector and household finance streams; commits at least 0.5% of GDP to sanitation development, and ensures a separate budget line item for sanitation.

Infrastructure development: Supports the provision of basic sanitation infrastructure that fits settlement patterns and geo-hydrological conditions, and can be improved, upgraded and extended over time.

Institutional arrangements for service provision: Ensures that institutional arrangements and partnerships are in place for sanitation provision beyond the collection of faecal and other human waste (through the chain to transportation, disposal and re-use where applicable). Water, sanitation and or hygiene services can be provided by a range of entities depending on a country's policy and legislative framework. These include local government itself, a community based organisation (CBO), a large or small private entity, a utility, a state owned water company, an NGO, or a combination of these.

Regulation: Ensures that basic public safety standards are met, quality control of works, monitoring, supervision, and that bylaws are in place and enforced with respect to the management, disposal and re-use of human waste.

To effectively undertake their roles and functions in sanitation and public services delivery more generally, government agencies often require capacity support.

Source: Mulumba, et al., 2014, p.205.

1.5 MONITORING SUSTAINABLE SERVICE DELIVERY

Monitoring is required to assess the current state of affairs and whether interventions are having the desired effects. It is important for the sector to constantly be aware of, and adapt to, current challenges.

A shift towards a 'whole-system approach' will require for a sanitation service to account for the entire sanitation chain in order to be environmentally sound and sustainable – through monitoring the way in which the system accommodates behaviour of all actors in the chain with respect to concomitant health and welfare advantages. Currently, the WASH sector focuses primarily on user behaviour in the containment phase and progress is measured both in terms of the numbers of new facilities constructed and users reached through hygiene programmes. However, internationally, the sanitation sector realised the need to move beyond merely implementing projects that tackle – and report on – access figures. The proposed shift from the MDGs

that count access to toilets to the Sustainable Development Goals (SDGs), reflect this shift; and targets are proposed to tackle issues across the sanitation chain.⁴ When moving towards a 'whole-system approach', monitoring efforts will require the development of new methodologies and indicators to understand whether the necessary systemic changes are occurring.

This shift in the understanding of what constitutes sanitation will require monitoring methodologies to change simultaneously. In order to do so there is a need to monitor the level of service received at household/ user level, but also the performance of the service provider and that of the service authority. For example, in Dhaka, where people already use toilets (see Illustration 1), it is necessary to enforce regulation that ascertains and monitors that: people do not illegally connect their toilets to drains; entrepreneurs do not dump the sludge in safe areas or indiscriminately; treatment plants comply with effluent standards; and solid waste ends up where it should.

⁴ The proposed SDGs on water and sanitation (SDG 6) can be found here: sustainabledevelopment.un.org/focussdgs.html

Van der Voorden and Krukkert (forthcoming) identify four different trends in the field of sanitation monitoring:

1. a shift from monitoring infrastructural outputs to behavioural outcomes (of users, service providers and service authorities);
2. diversification of monitoring aspects and actors, whereby those who are monitored increasingly act as implementers of the monitoring activity (see for example Baetings and van Daalen, 2014);
3. growing attention on monitoring sustainability and equity in service delivery (see also Boulenouar, et al., 2013); and
4. consolidated efforts to systematise and harmonise monitoring indicators that link local level monitoring and national-level systems.

Other issues that will need to be explored include questions regarding finance ‘how much does it cost to monitor’, ‘who finances these costs’; and from an institutional perspective ‘who is responsible for monitoring a specific level or a specific component of the sanitation chain’.

1.6 OVERVIEW: THE FIVE CORE CONCEPTS FOR A WHOLE SYSTEM CHANGE IN URBAN SANITATION

This chapter discussed the five core concepts that inform a whole-system approach in urban sanitation (Figure 2). As exemplified above, the concept of the sanitation chain enlarges thinking of sanitation services beyond household level to involve all steps from human waste containment to treatment and safe disposal. As sanitation provision moves from the delivery of hardware to the delivery of services, there are encouraging signs that monitoring systems have started to work with service level indicators. Similarly, there is clear evidence that the WASH sector is making headway in delineating sector stakeholder roles and responsibilities, with calls for government to take a leading role (the ‘champion’) to facilitate this process of whole system change. Lastly, this chapter demonstrated the importance of monitoring the level of services delivered at household level and the performance of service operators and the service authority to safeguard the continuous improvement of service delivery.

These core concepts need to be considered and addressed for interventions in urban sanitation to have a chance at becoming more sustainable and in reaching the optimum number of people and

communities that require urgent access to sanitation services in cities. In the following chapter, the complex challenges to providing sustainable sanitation services at scale are discussed.

2 Challenges to overcome in the urban sanitation sector

The problems in the urban sanitation sector will not be resolved solely by considering the five core concepts described in the previous chapter. The underlying structures that led to the current state of affairs are engrained in the way the sanitation sector is governed, as well as the wider issues of urban governance. This means that a meaningful intervention that attempts to change an urban sanitation system will also have to take the bigger urban governance system into consideration.

This chapter addresses some of the persistent issues around urban sanitation and links them to wider problems of urban governance. This is done according to the five dimensions of WASH sustainability used by the Dutch Wash Alliance: financial, institutional, environmental, technical and social aspects (FIETS) (see Box 2). The challenges addressed in the chapter are summarised in Table 1.

BOX 2 SUSTAINABILITY PRINCIPLES (FIETS)

In order for a sanitation service to continue fulfilling its functions over time sustainability, in its various dimensions, needs to be taken into account. The Dutch WASH Alliance uses the following five dimensions of sustainability:

Financial: To keep a service running for a lifetime, there is a need to consider more than just initial constructing costs. Life-cycle cost analysis makes clear what these costs are, allowing for better planning for example for maintenance costs. (Burr and Fonseca, 2011).

Institutional: Service authorities and service providers need to be in place with a clear mandate, a regulatory framework, coordination and support across regional and sub-regional levels. This allows coordination of all actor and creates an enabling environment where sanitation businesses can thrive (Verhagen and Carrasco, 2013; Luthi, et al., 2011).

Environmental: A sanitation service should not/minimize harm to natural resources including groundwater at all stages of the sanitation chain (Potter, et al., 2011).

Technical: The infrastructure in place should be built based on durable design criteria, considering proper operation and maintenance of the infrastructure (Tilley, et al., 2008). This also includes taking into consideration the supply chain for spare parts or replacements.

Social: A service should be safe, non-discriminatory (including physical access to all), culturally acceptable and affordable (de Albuquerque, 2014; COHRE et al., 2008). Social inclusion is both a human rights imperative and a sanitation system needs to be in place for all in order to deliver it function in terms of public health and environmental protection.

TABLE 1 MAJOR CHALLENGES IN URBAN SANITATION

Financial	Institutional	Environmental	Technical	Social
Limited public financing for sanitation	No single institution is responsible for sanitation	Dumping of human and solid waste is common practice, both at household and city levels	Private, public and communal systems; narrow, inaccessible streets	Social exclusion across multiple dimensions
Public financing goes to networked system and not to on-site systems	Limited capacities of public officials, especially in smaller towns Land tenure issues prevent changes in informal settlements	Regulations are weak and enforcement is poor Convergence of waste flows lead to treatment and reuse problems	On-site versus off-site systems Treatment systems	Operators carrying out unsafe work are un- or under qualified workers Unintended consequences of sanitation interventions

2.1 FINANCIAL ISSUES

Two main problems can be identified with regards to financing urban sanitation. Firstly, far too little public funds are directed to the urban sanitation sector despite the magnitude of the problem. Sanitation is in many cases still considered by governments to be a household responsibility, or one that can be covered through international aid as illustrated by the low anticipated allocation of government revenue in most African countries (Table 2). Secondly, the public funds that are directed towards urban sanitation are largely used for sewerage and wastewater treatment

facilities, which only benefit a small, wealthy part of the urban population. A WaterAid/SHARE study on public finance for urban sanitation in Dar es Salaam found that while 83% of the population rely on on-site sanitation, only 0.9% of public funding on capital investments went to sanitation services. The remaining 99.1% of public funds invested in sanitation infrastructure was directed to wealthier households with access to sewerage and treatment services (Trémolet and Binder, 2013, p.30). Although the exact picture may vary from city to city, these two phenomena persist throughout Africa and Asia.

TABLE 2 INVESTMENT DATA: URBAN SANITATION

Country	Assumed user contribution	Planned cost per beneficiary (US\$) government	Anticipated domestic allocation as % government revenue	Deficit (US\$ million) government
Angola	0%	136	0.43%	-
Benin	80%	164	0	96
Burkina Faso	20%	41	0.07%	3
Burundi	10%	106	0	8
Central African Rep.	0%	10	0.09%	1
Cameroon	30%	72	0	120
Chad	0%	75	0	10
Congo-Brazzaville	0%	21	0.01%	0
Dem.Rep. Congo	40%	124	0	253
Ivory Coast	10%	101	0.08%	91
Ethiopia	100%	107	0.61%	-
The Gambia	0%	51	0	6
Ghana	100%	261	0	-
Kenya	48%	191	0.54%	5
Liberia	50%	291	0	32
Madagascar	90%	291	0.00%	-

Country	Assumed user contribution	Planned cost per beneficiary (US\$) government	Anticipated domestic allocation as % government revenue	Deficit (US\$ million) government
Malawi	30%	80	0.13%	11
Mali	30%	28	0	2
Mauritania	25%	81	0	10
Mozambique	38%	86	0.22%	21
Niger	50%	58	0	12
Nigeria	50%	88	0	1195
Rwanda	70%	74	0.15%	6
Senegal	10%	160	0.13%	14
Sierra Leone	25%	119	0	26
South Africa	10%	420	0.43%	437
Sudan	80%	245	0.02%	306
Tanzania	73%	52	0.04%	25
Togo	0%	121	0.07%	37
Uganda	53%	34	0.02%	3
Zambia	30%	26	0	3
Zimbabwe	30%	132	-	273

Source: Presentation adapted based on data from AMCOW, 2011, p.9.

Funding mechanisms are generally directed towards larger service providers, thereby neglecting those that serve a large part of urban populations (Trémolet, et al., 2012). Individual, poorer households are thus expected to invest in the construction, operation and maintenance of their own sanitation systems, which can amount to a substantial amount of funds. In Dar es Salaam for instance, it was found that the costs of

building, improving and emptying latrines are considerably high when compared to the yearly income of those living below the poverty line. This deters many households from improving their latrines, and leads them to let the pit latrine overflow during the rainy season to save on emptying costs (Trémolet and Binder, 2013).

2.2 INSTITUTIONAL BARRIERS

There are typically three major barriers that impede the rapid reform of the urban sanitation sector at institutional level:

1. the lack of a single institutional 'home' for urban sanitation;
2. the lack of professional and organisational financial and human resources capacities;
3. the issue of land tenure.

2.2.1 Institutional coordination

In many cases, general sanitation is not governed by a singular institution; this is obviously also the case for sanitation issues in urban areas. In urban areas, responsibilities are often shared between infrastructure departments, water and sanitation utilities and (environmental) health and education departments. Division is often based on technology: utilities often have the responsibility for centralised

systems, and the service authority is responsible for on-site systems (through the local environmental department). The importance of having a single institution that is responsible and accountable for the provision of sanitation has been long recognised, for example, in point 5 of the 2008 eThekweni Declaration on sanitation (AMCOW, 2008, p.3):

To ensure that one, principal, accountable institution takes clear leadership of the national sanitation portfolio; establish one coordinating body with specific responsibility for sanitation and hygiene, involving all stakeholders, including but not limited to those responsible for finance, health, water, education, gender, and local government...

However, in 2011, AMCOW found that only a third of African countries had designated a single government agency with a clear mandate to lead in policy development and planning for sanitation.

BOX 3 GOVERNANCE OF URBAN SANITATION IN LATIN AMERICA

As part of the SWITCH project (www.switchurbanwater.eu), a comparative analysis of the governance of urban sanitation was carried out drawing from cases in Belo Horizonte (Brazil), Cali (Colombia) and Lima (Peru); the following quote comes from the abstract of the article describing their findings (Smits, et al., 2008; text in **bold** are emphases made by the author of this paper):

"Cities in Latin America face a double challenge in environmental sanitation, of both providing access to basic sanitation for those currently lacking that, and improving the collection and treatment of wastewater. Governance is identified as a crucial factor affecting the way in which these challenges can be met. From analysing the current governance arrangements in three cities namely Belo Horizonte, Cali and Lima, it shows that all three cities have seen the application of governance reforms, such as decentralisation, the establishment of independent regulators and water resources authorities, and democratisation of decision-making procedures. These all have contributed to the separation and distribution of governance functions over local authorities, utilities, control agencies and civil society alike. **This specialisation has led to a certain degree of fragmentation of roles, resulting in a lack of integration in planning sanitation services.** Developing specific mechanisms for joint-up planning have proved to be able to overcome some of these integration problems. **Capacity of stakeholders to carry out their functions is also found to be a crucial factor.**"

2.2.2 Capacity levels

Organisational and professional capacities at the municipal level to deal adequately with sanitation assessment, planning and implementation are weak. This is especially a problem in small- and medium-sized towns where most growth is forecast to take place in the near future (Schaub-Jones, 2011). This problem can be partly offset by hiring consultants, but this is not always possible due to a lack of financial resources. In the Indonesian urban sanitation development programme (USDP), each participating municipality was given access to a city sanitation facilitator at its disposition who is a local consultant

trained at national level specifically for this purpose (The World Bank and AusAid, 2013). While a consultant may be a temporary solution, it is nevertheless important to parallel develop the human resources capacities within the relevant municipal department to effectively deal with sanitation.

2.2.3 Land tenure

Land tenure is a crucial and thorny issue, which at times proves to be a key barrier to improving urban sanitation. In urban areas where illegal settlements and squatting communities are found, public officials may not have the legal mandate to provide services to

these areas. This allows politicians and community leaders to politicise service provision (such as water, sanitation and electricity), as they are often approached by the urban poor to broker for these services (Jha, et al., 2007). This often leads to situations where services are bought and sold through votes by so-called 'vote-banks': politicians are elected on the basis of services delivered to a community, winning the politician a single block vote (Baken, 2003). For a sanitation intervention to be successful, its political implication must be acknowledged and dealt with. Moreover, for a sanitation intervention to lead to positive health spin-offs, services need to be delivered to a complete area (neighbourhood or ward) and not only the formal. As pathogens do not make distinctions between formal and informal areas, public health risks will continue to exist for everyone living in a shared area, if sanitation services are only delivered partially. An example of such a partial intervention is the large World Bank-funded Mumbai Slum Sanitation Program. This programme only managed to construct communal toilet blocks in legalised slums, which amount to approximately half of the city's slums, thereby limiting the overall effect of the programme (Sarkar, et al., 2006).

2.3 ENVIRONMENTAL ASPECTS

Three major inter-related challenges can be highlighted in the environmental domain of urban sanitation. Firstly, the indiscriminate dumping of human and solid waste; most of which happens at the household level, is a serious issue. Secondly, the low enforcement capacity of environmental health officers makes the application of environmental regulation nearly impossible. This is

further exacerbated by the absence of environmental regulations and corruption of environmental officers. Thirdly, the unsegregated forms of waste ('convergence') make safe collection, treatment and reuse of waste(s) a complicated and expensive process.

2.3.1 Dumping waste

The first issue of indiscriminate dumping of waste happens at the household level with unlined pit latrines or septic tanks, which leak into the groundwater or are directly connected to open drains. In the rainy season many poorer households choose to open these latrines and tanks to flush out the waste (WSP, 2014; The World Bank and AusAid, 2013). Solid waste is also dumped indiscriminately when collection systems are not put in place. All this solid waste and wastewater ends up in drains and creeks, which cannot perform their function as stormwater discharges, thereby increasing flood risks. At municipal level, practices of dumping untreated wastewater into rivers or the sea, or in the case of solid waste in unprotected sites, are equally common (UNEP, et al., 2010). This dumping by municipal authorities is perhaps even more troublesome because it is very difficult to find a single accountable culprit, making enforcement difficult, therefore, justifying unsanitary practices at the household level.

2.3.2 Environmental enforcement

The low enforcement capacity of environmental health officers is a result of a number of factors, such as, for instance: environmental policies may be insufficient or inadequate; training of officers may be insufficient or absent; and the department charged

BOX 4 ENVIRONMENTAL POLLUTION IN TWO ASIAN TOWNS

The WASPA project (2005-2008) carried out in the towns of Kurunegala in Sri Lanka and Rajshahi in Bangladesh focused on sanitation, wastewater irrigation and the governance thereof. The following quote comes from a paper describing the project's findings in both towns (Smits, et al., 2009, pp.49-50; text in **bold** are emphases made by the author of this paper):

"The WASPA project started from the premise that a lack of access to sanitation in low-income communities leads to the generation of wastewater flows, [...]. The project found that in the intervention areas in both towns, the lack of access to sanitation in low-income communities only contributes in a minor way to the generation of wastewater flows. **Unauthorised sanitation connections, direct draining of greywater, leakage from septic tanks and illegally dumped garbage, and effluents from small industries are the most important sources of pollution.**

[...] Various reasons were found why the issue so far had received little attention in both cities. First of all, there was little awareness among the communities and authorities involved of the situation. It was not seen as the key problem they faced, and little data and information was available. Secondly, wastewater management has so far fallen between the cracks of institutional fragmentation. **Different authorities play a role along the chain of contamination, without clear final responsibilities. Even where these exist, enforcement is poor.** This situation is compounded by the fact that poor accountability relations existed between the authorities and those communities affected. A further complicating factor is the mismatch in boundaries: in both cities affected farmers fall under different jurisdictional areas from the municipalities from where the pollution occurs. They therefore struggled to hold those authorities to account."



Convergence of human and solid waste in a stormwater drain in Mumbai, India (Photo by Giacomo Galli/ IRC).

with enforcement may be severely understaffed and possibly even have diminished authority to enforce existing regulations (McFarlane, 2008; Zimmer and Sakdapolrak, 2012). Moreover, corrupt practices may lead environmental health officers to turn a blind eye. These are all issues that are not easily resolved, but need to be taken into account and addressed when reforming an urban sanitation system.

2.3.3 Convergence of waste

The convergence of waste described in Box 4 brings about several complications. For those who empty pit latrines with machines (such as suction trucks) separating solid waste (such as plastic bags or cloth) from the sludge is an unpleasant necessity, which can only be done manually (Nkansah, et al., 2012). These time-consuming activities have a big impact on the service provider's business and the level of service that s/he can provide. Resource recovery such as the reuse of plastics or the solid or liquid part of treated human waste becomes increasingly difficult to do when all these waste flows converge. Small-scale unregulated industrial activities in poor inner city neighbourhoods such as tanneries or garment fabrics in Asian cities complicate this even further, as these add synthetic and highly dangerous contaminants to the wastewater. At a neighbourhood or city level, the

management of this waste becomes increasingly difficult as it is unclear which department is responsible for which waste. For instance, when human and solid waste is dumped in a stormwater drain (see photo above), it becomes unclear whether the responsibility of this waste falls under the drainage, solid waste or sewerage department.

2.4 TECHNICAL CONSIDERATIONS

Densely populated areas lead to a variety of technical challenges for urban sanitation services. This chapter will highlight the issues around private, public and shared facilities; co-existing on- and off-site systems; and issues surrounding treatment systems.

2.4.1 Private, public and shared facilities

In urban areas, shared facilities are quite common in poorer neighbourhoods, as it may be physically impossible to opt for a private latrine in a small dwelling shared by a large number of people. Initially, the assessment of the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation considered these types of shared facilities to pertain to the 'unimproved' category; the latest reports still consider these as unimproved, but mentions these separately (WHO/UNICEF, 2014).

A review study by Heijnen, et al. (2014) found that shared facilities are linked to increased health risks, when compared to individual latrines. However, there is also evidence to the contrary: in Dar es Salaam shared latrines were found to be more likely to be safe, hygienic and sustainable functionally as various low-income households can bundle greater resources to invest in operation and maintenance costs to maintain a level of service quality (Jenkins, et al., 2014).

Within shared latrines, a distinction should be made between community-run toilet blocks (Burra, et al., 2003) and public pay-per-use facilities. Community-run toilet blocks are ideally managed and maintained by a local committee, possibly in combination with the municipal authority, such as in the case of the Mumbai Slum Sanitation Program (Sarkar, et al., 2006), while public pay-per-use toilets are owned and managed by a professional enterprise. This model is often found in public spaces such as railway stations and markets. Both systems have their advantages and disadvantages: while the former is likely to be cheaper, there is a risk of exclusion of certain community members and misappropriation of maintenance funds (Sharma and Bhide, 2005). For the latter, there is anecdotal evidence of public toilets being used as cash-cows, or for money laundering activities of their owners.

Whether private or shared, one issue that is of crucial importance for (large) maintenance is the accessibility for service operators to this facility. In narrow and inaccessible streets, it may be physically impossible to access the facility, for example for pit emptying. This means that for sustainable management of the existing latrines, or block units, some retrofitting or innovative technologies may be necessary to facilitate proper access to these latrines.

2.4.2 The neglect of on-site systems

In many cities in low- and middle-income countries, networked, reticulated infrastructure for sanitation service provision, which only serves a small, affluent part of the city's population is often found. The rest of the population uses on-site solutions, which include pit latrines (lined and unlined) or latrines attached to septic tanks or other containers. These two systems are largely linked to the socio-economic standing of the individual or the household. Ironically, urban 'haves' are provided with sewerage systems through public funds, while the 'have-nots' carry their own costs – most of the time these 'costs' are simply shifted to the open environment, as waste is dumped in drains.

A recent study by WSP (2014) has shown how on-site systems (such as pit latrines and septic tanks) make

up for the most common type of sanitation facilities in cities of low- and middle-income countries. However, these remain invisible to most policymakers, as individual latrines are largely considered to be a household responsibility, and are therefore not monitored by authorities. Besides, most formal service operators tend to be only associated with networked infrastructure, and are therefore blind to the on-site component which lies out of their mandate.

Emptying pit latrines and septic tanks is an established, albeit not always profitable business in various countries (Verhagen, et al., 2012; Nkansah, et al., 2012). However, this sector is also largely unregulated and uncontrolled, with little oversight from private operators (WSP, 2014). For the operators emptying latrines in narrow streets, the high number of visits to empty a single pit with small-size equipment, and the long haulage trips to distant disposal sites make these emptying activities difficult and expensive (Ingallinella, et al., 2002; Nkansah, et al., 2012). Overall, the result is a poorly managed faecal sludge chain with many pit-emptying service operators who choose to dump the sludge in the open environment; this may also take place in nearby agricultural areas where untreated faecal sludge is reused as fertiliser (Verhagen, et al., 2012). Fortunately, there are also some positive examples observed in Dakar, Senegal where faecal sludge management is being taken increasingly seriously by the municipal service provider (see WSP, 2007; Arbogast, 2014).

2.4.3 Treatment and disposal or reuse

The proportion of treated wastewater and the level of treatment are very low in most low- and middle-income countries (UNEP, et al., 2010). This is partly due to the unavailability of treatment systems, but also of the broken treatment plants. A study in Ghana on treatment plants, found that the majority were non-functional (Murray and Drechsel, 2011), largely due to human and financial factors, and inappropriate technology (an example is the complete dependency of these plants on electric current, while frequent blackouts occur).

Facilities that treat sewerage or faecal sludge typically occupy a large space. Owing to scarcity of free land in urban areas, these treatment plants are usually located some distance from populated areas; this is also because of odour (smell) nuisance. Many treatment plants that do work operate under their full capacity, as the faecal matter never reaches treatment plants due to illegal dumping. Sewerage systems that operate under their designed capacity

run the risk of malfunction as the low flow-rate in the sewers can lead to siltation and blockages.

Another issue to consider is the reuse or disposal options of faecal sludge or wastewater. Conventional treatment facilities that focus more on disposal are designed to take into account the characteristics of the effluent coming into the treatment system and the national guidelines on water quality levels allowed for safe disposal. Designing a treatment system that is oriented towards reuse of the effluent will have to consider the important properties of the effluent/sludge to be reused. A treatment system could then reduce the treatment steps so that the matter which is not beneficial for reuse is removed from the effluent (Huibers and van Lier, 2005). For example, in the case of fertiliser reuse where high nutrient content is of value, such substances will be left in the effluent/sludge.

Another important element to be taken into account is the legal framework, which regulates the reuse of wastewater or sludge. In many countries reuse is practiced at a large scale, but this is often unregulated and not monitored. Existing regulations may be designed to maximise food safety, and therefore, making it unfeasible for reuse-orientated treatment systems. The 2006 WHO guidelines on the reuse of wastewater provide a framework, using a relative-risk approach which encourages progressive measures to reduce risk of exposure to microbial hazard (WHO, 2006). In contrast, earlier guidelines were based on compliance or non-compliance to strict standards.

2.5 SOCIAL ISSUES AROUND SANITATION

Social issues that encroach on improving urban sanitation are plenty. This includes the degree of social inclusion that inform urban sanitation governance and arrangements, the plight of those working in the lowest rungs of the urban sanitation sector, and making sure that sanitation intervention cause more good than harm for the urban poor.

2.5.1 Social exclusion

One of the most challenging issues around urban sanitation is the degree of social inclusion. For sanitation services to effectively reduce public health risks, they have to be designed in such a way that all living in a certain area are taken into account. There is a moral imperative to deliver and make sanitary services accessible to all. Since 2010, the right to safe, physically accessible, affordable and culturally acceptable sanitation services has been recognised as a human right by the United Nations (UN General Assembly, 2010; UN Human Rights Council, 2010). Nevertheless, axes of societal marginalisation continue to be reflected in access data to sanitation services, this includes exclusions based on gender, race, poverty, religion, caste, age, migrants, etc. (The World Bank, 2012; WHO/UNICEF, 2014; de Albuquerque, 2012). In many cases these types of exclusion are not directly taken into account in sanitation monitoring systems. Doing so, would allow the problems to become visible, for example as shown in Illustration 2.

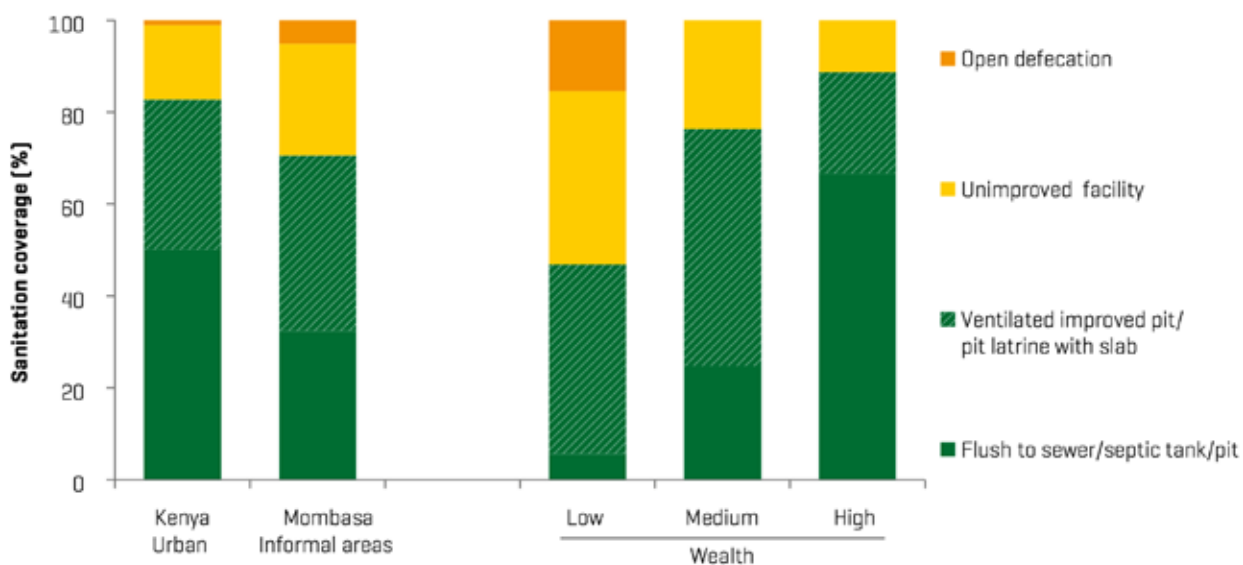


ILLUSTRATION 2 TRENDS IN IMPROVED SANITATION COVERAGE IN INFORMAL SETTLEMENTS IN MOMBASA, KENYA

Source: WHO/UNICEF, 2014, p.30.

Low access to WASH services and social marginalisation are mutually re-enforcing processes. For the urban poor – living in informal settlements or peri-urban areas – formal access to water and sanitation services is hard to come by, due to high connection fees or because of land tenure issues. At the same time, the lack of access to these services reinforces inferior social positions within a city, as these areas (and its inhabitants) are considered to be dirty (Joshi, et al., 2011). Another dynamic of exclusion occurs through the home tenure. Many residents in a city, especially among the poor, rent their homes. For sanitation services, home tenure is an important consideration as potential absence of owner has a direct influence on the willingness to invest in sanitation services and infrastructure. Typically, this issue is resolved through a legal obligation to construct sanitation facilities as part of an overall construction permit; however for many it may well be that this is not being enforced. Many owners choose to increase rent after investing in sanitation, thereby driving out tenants that are unable to afford this. It is important to keep in mind that the owner of an urban dwelling being discussed may be just slightly wealthier than the tenant (Scott, et al., 2013; WSUP, 2013).

2.5.2 Professional hazards and stigma

One of the most obvious links between social exclusion and sanitation occurs amongst those who work in the lowest rungs of the sanitation sector. Most of the work in this sector is either of an informal nature, however, the municipality may also hire workers. Often these workers lack the appropriate training and are not equipped with safety material; subsequently such workers suffer from a variety of diseases ranging from skin rashes to serious, contagious illnesses. Notorious is the social plight of those that manually empty the latrines, as this work comes with high health risks and social stigma (see among others for Ghana: Van Der Geest, 2002; and for India: Srivastava, 1997). In South Asia, this work is caste bound and considered to be eternally polluting; it is carried out by the so-called untouchable caste, the Dalits (Srivastava, 1997). As Dalits are banned from undertaking other occupations, they find themselves stuck in this work. An off-site variant of this work is carried out by the sewage divers, men who go inside underground sewer lines and stormwater drains to clean out blockages; at times these sewage divers get trapped or die from suffocation due to gas leaks.

2.5.3 Consequences of urban sanitation interventions

Interventions that seek to improve urban sanitation conditions may also have unintended and negative consequences, which are harmful to the urban poor. In dense urban areas, some evictions may be seen as

necessary to accommodate the infrastructure needed to deliver services. When operating in such areas, where residents possibly do not have well-defined and safeguarded rights, infrastructural interventions may be contested, leading at times to outright opposition against a development programme. Mediating between the need to put in place public infrastructure and the wishes of individual residents will always be an extremely delicate issue, which can go wrong when not carried out properly. IRC has had similar experiences in this field in the case of the Basic Urban Services (BUS) project in Kotte and Wattala, Colombo, Sri Lanka, 2004–2007, where due to local and political dynamics, the project failed to fulfil its objectives as local leaders managed to rally the population against the project (see Smet, 2008 for further elaboration). Clearly, resident needs for both housing and public sanitation services must be safeguarded. This will require working with civil society groups at community level to make sure that the intersection of rights are not infringed, but also that municipal officers are trained to negotiate with community groups for appropriate compensation; to make sure that infrastructural projects do not lead to a form of 'blind redevelopment' that results in urban poor displacement.

2.6 OVERVIEW: MAJOR CHALLENGES IN URBAN SANITATION

This chapter presented an overview of some issues surrounding sanitation in complex urban environments, which are summarised in Table 1. There are various aspects that should be taken into account when considering to transform the urban sanitation sector. Recognising that sanitation is a critical component of the urban environment and its governance arrangements will lead to more effective strategies that address the various dimensions of city life. Understandably, these dimensions may lead to a state of paralysis as IRC experienced in its BUS project. However, entering into urban sanitation initiatives that go beyond the construction of latrines is already a first step. Successful steps toward improving urban sanitation will have to carefully navigate between an ambitious future vision and introduce progressive changes that considers available human and financial resources and capacities.

This chapter applied the FIETS Sustainability Principles to analyse the multi-faceted dilemmas and dimensions of undertaking reforms to transform urban sanitation. The next chapter discusses different approaches that can be employed to aid in this process of change.

3 Outlining the process of change towards a ‘whole-system approach’ in the urban sanitation sector

This working paper has so far argued for the need for drastic changes in approaches to the urban sanitation sector by first presenting the core concepts for such a change process to occur (Chapter 1), and describing the challenges that influence outcomes of urban sanitation sector reform (Chapter 2). The last two chapters of this paper outline a proposal to initiate this process of change in urban sanitation.

The objective of the proposed process of change is to move from an urban sanitation sector that is locked in inertia and unable to move beyond ‘business-as-usual’ approaches, to a sector that is motivated, is able to learn, and adapts to continuously improve itself. Moving away from linear infrastructure-driven interventions to an iterative ‘whole-system approach’ of catalysing sector change is foreseen to be a long, expensive and messy process. Some scholars argue that the struggle that will emerge from readjusting such a system will make this change more sustainable, as opposed to an externally imposed system (Barder, 2014). Acknowledging the

shambolic politics surrounding urban sanitation will therefore be crucial to make such a transition feasible.

By presenting examples from IRC’s experiences in the Triple-S programme – that is working towards the transformation of the rural water sector in Ghana and Uganda – and other examples that illustrate the management of complex systems, this chapter outlines some directions on how to approach urban sanitation reform. This chapter is not so much about giving clear answers on the next steps forward, rather it sketches a process on how to get there.

The importance of the process towards a whole system change cannot be overstated (Barder, 2014). For IRC’s Triple-S programme the theory of change has been outlined to consist of three different phases, some of which co-occur: the initiation phase, the learning and testing phase; and the scaling up and systemic impact phase (Figure 4). This approach builds on planning approaches further described in Annex 1.

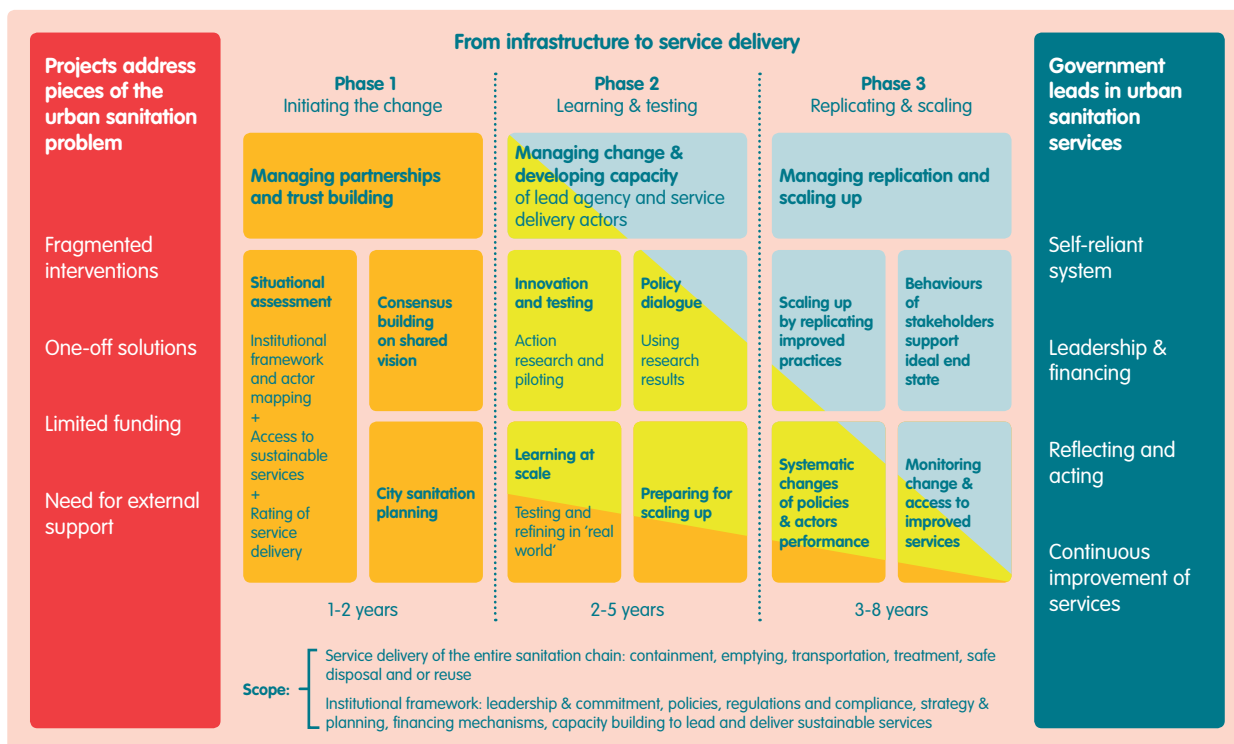


FIGURE 4 THEORY OF CHANGE FOR URBAN SANITATION SECTOR REFORM

Source: Baetings and Galli, adapted from Moriarty and Lockwood, 2014b.



Learning Alliance planning exercise, Indonesia, 2011 (Photo by Christine Sijbesma/IRC).

3.1 PHASE 1: INITIATING THE CHANGE

The first hurdle to overcome when dealing with systemic flaws – such as is the case in the urban sanitation sector – is getting stakeholders to acknowledge that there is a problem at hand, and that ‘business-as-usual’ solutions will not work as expected. But most importantly, there must be a clear ‘champion’: an organisation, institution or platform with the legal mandate to act and take responsibility to do so. In IRC’s view the role of a champion can be best assumed by a national service authority that has the legal mandate and responsibility to act, and can make legitimate claims to access public funds necessary for such a reform process. In turn, the national service authority can involve other key stakeholders, such as municipal service providers.

The role for organisations working in the (international) sanitation sector, such as NGOs or think tanks, should at this stage, act as ‘catalysts’ to inspire, motivate and support the service authority and service providers in this transformation process. The catalyst needs to engage with key expert organisations and collaborate with other sector stakeholders to develop a broad consensus that there is a problem at hand, and that ‘business-as-usual’ solutions are no longer effective. The catalyst plays a clear role in managing partnerships and building

trust. It must, however, refrain from taking the lead in any change process: implementation is the role of the service authority. Ideally, such a catalytic institution will articulate the proposed and desired end state, and map out the steps to get there. For the change to be sustainable, the process will need to be endogenous: the catalyst will have to foster good relationships with the service authority and stimulate the latter to take action and support the process to move forward.

To involve key stakeholders in a process of innovation IRC has worked extensively with Learning Alliances – an approach that engages a diverse range of stakeholders in the shared search for solutions through joint diagnosis and visioning of the future. Learning Alliances can be defined as a series of interconnected, multi-stakeholder platforms at different institutional levels (for example national, district and municipal), aimed at strengthening the process of identification, development and scaling up of innovations.

The more representative the alliance is, the better it will capture the organisational complexities that constitute the realities of the urban sanitation system (Smits, et al. 2007; Butterworth, et al. 2011) However, to get change processes off the ground takes time and dedicated resources. This first phase is therefore

about creating a shared understanding of a problem and building the momentum to inspire a need for change. A plausible start would be a citywide situational assessment of the urban sanitation status, the functioning of the relevant institutions and an analysis of the state of the sanitation market. There will be a need to balance between rigour and speed during this phase, for a study that is too detailed and takes too long will result in the loss of interest among key stakeholders. This then needs to rapidly evolve into a shared vision of a desired end state to initiate city sanitation planning. Again, the national service authority needs to be in charge here, but clearly it is important to build consensus around this shared vision. It is also crucial to ensure that some level of

political commitment is secured at this stage, to support this shared vision with the necessary mandate.

In practice, it is envisioned that the initial assessment is done using tools corresponding to the five core concepts described in Chapter 1. Examples of corresponding tools that can be used for each of the core concepts that have been developed by different organisations are shown in Figure 5. These tools are simultaneously used to create awareness on the urban sanitation system, which could serve as a preliminary baseline data gathering method. In some cases, new tools may need to be developed to fit the core concepts.

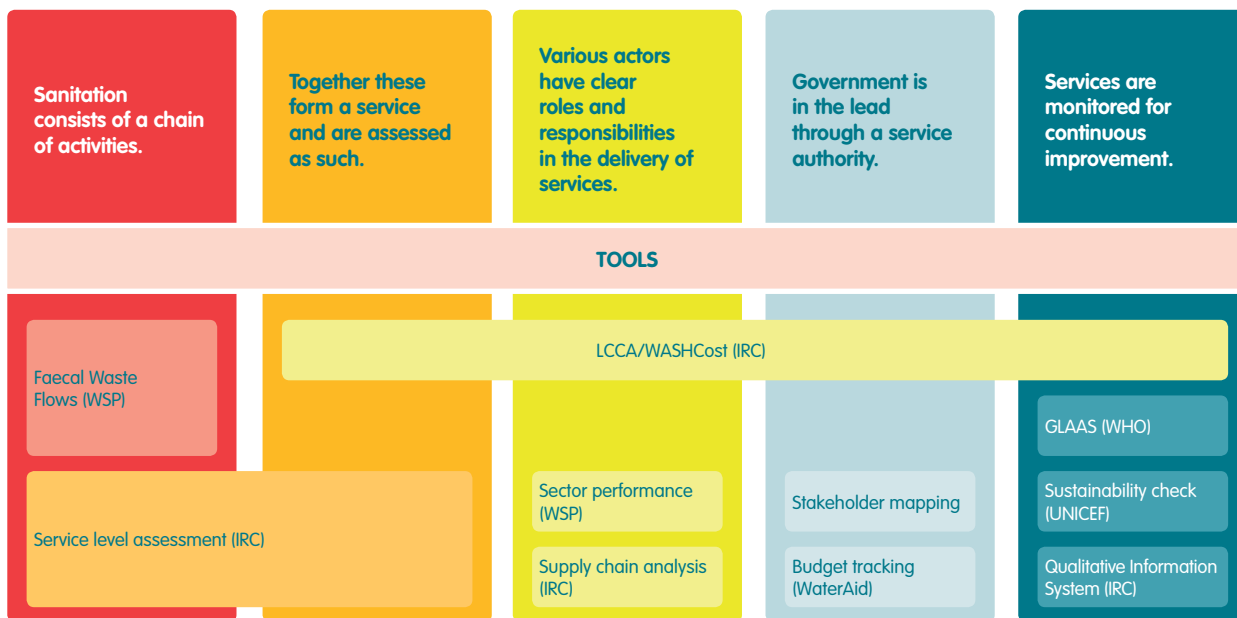


FIGURE 5 THE FIVE CORE CONCEPTS AND ACCOMPANYING TOOLS

3.2 PHASE 2: LEARNING AND TESTING

The second phase revolves around finding solutions through learning and testing. A common practice in the field of international development is the export of ready-made solutions, based on the belief that what works in one international situation will automatically work in a developing country (Pritchett and Woolcock, 2004). This often takes the form of ‘taking proven interventions to scale’ or ‘replicating successes’ (Barder, 2014). This course of action is undesirable for two reasons. Firstly, as described above, a successful system intervention is the outcome of the interaction between stakeholders, not an input that can be copy-pasted elsewhere. Secondly, when an intervention is promoted through

a project, there is a high pressure on demonstrating that it works within a short timeframe. In practice, this increases the risk that project implementers choose to bypass the relevant institutions at government level and the long-term collaboration that culminates from working with these and other relevant stakeholders. External actors such as international NGOs, then take on the role of service providers (for example by constructing and operating a public latrine). Although this may speed up the project implementation phase, this course of action weakens the role of the public sector as the legitimate service provider, and by avoiding the lengthy process of fostering firm collaboration with the relevant authorities – the intervention sacrifices the necessary legitimacy (Barder, 2014).

Instead, it is worthwhile to invest in learning at scale and experimenting. For instance, this can be done by learning from initiatives that are already present on the ground, sharing these within sector platforms and attempting to replicate these in other cities, or wards. Snowden and Boone (2007) argue that when dealing with complex systems it is better to “probe, sense, respond,” for example by conducting safe-fail experiments that monitor progress and amplify or dampen these accordingly. IRC has carried a similar iterative approach through its Learning Alliances. This allows for innovation and testing at a local level, and sharing and learning at meso- or macro level (Verhagen, et al., 2008; Smits, et al., 2007). The role of external organisations, such as NGOs, is to encourage the active participation of relevant stakeholders in the process and prompt ‘thinking outside the box’. This is required both to ensure that all five core concepts are kept in consideration in this phase, as well as to introduce ideas, concepts and promising examples from other parts of the world. The learning component in this second phase is actively stimulated through capacity development activities to enhance the performance of individual organisations and the sector as a whole; it is about managing change and developing capacity. This ensures that the urban sanitation sector is able to innovate, and is also capable of delivering services at an adequate level. This will require trainings at both national and municipal levels. Initially, these trainings will have to address the issues outlined in Chapter 2. As the reform programme continues other problems will undoubtedly emerge; new trainings will need to be devised to deal with these. Furthermore, monitoring systems, preferably based on the tools used in the initial assessments, will have to be put in place to ensure that the learning and experimenting that occur in this phase lead to the desired outcomes for the service level received by the users.

3.3 PHASE 3: REPLICATING AND SCALING UP

The end goal for a systemic intervention in the urban sanitation sector will not be to provide technical solutions to solve the sanitation problems of a particular city, but rather to change the national urban sanitation sector in such a way that problems are identified, acknowledged and dealt with at a local level. This systemic change ideally will also lead to continuous improvement and resilience to outside shocks (at least to some degree). This means that while some of the results of the second phase will be institutionalised, the process of experimenting, learning, refining and scaling up will be ongoing as new challenges will always emerge.

This goal of working towards a systemic change that leads to a sector that is able to continuously improve itself, will also mean that the national service authority will eventually be able to take on this role, without (too much) external support. At this stage, basic processes are in place to monitor changes in services and access to improved services, showing where issues arise, to allow continuous service improvement.

A municipal water and sanitation utility, which has been able to make this transition, and is internationally lauded for doing so, is the eThekweni Water and Sanitation Unit, winner of the 2014 Stockholm World Water Prize. This water and sanitation utility has managed to transform itself internally, from being an engineering-focused utility to a customer-oriented utility which services different kinds of customers. This has led to the utility offering a range of technologies to different customer types keeping in mind their geographic location, linking their consumption pattern to payment, while guaranteeing the human right to water and sanitation for all (Sutherland and Lewis, 2012).

As the scaling up phase gradually progresses, previous identified solutions are tested, monitored and mainstreamed when successful. Learning and experimenting is also gradually institutionalised, thereby allowing new ideas and responses to emerging challenges to emanate from various institutional levels and to be constantly fed back into national dialogues and the policy review processes. Being locally led and inclusive, with implementation and mainstreaming built in, the process allows scaling up by replicating improved practices, without falling into a ‘copy-paste’ approach.

This, in turn, means that as the change process becomes institutionalised through systematic changes in policies and actors performance, the contribution of an external catalyst actor has a clear expiry date. Together with the service authority, the organisation’s responsibility to monitor progress and behaviours of actors end and slowly retreat from its catalytic role. This withdrawal must be planned in such a way that the Learning Alliances and other learning and adaptive mechanisms are self-sustainable and supported by the service authority.

4 Conclusion and ways forward

About 756 million urban dwellers worldwide lack access to improved sanitation, according to the JMP (WHO/UNICEF, 2014). This working paper summarised the vision of IRC to embed a wider view of how urban sanitation problems can be resolved.

The WASH sector now widely recognises that the delivery of sanitation hardware to urban populations is only a first step towards achieving the end goal of sustainable sanitation services for all. This first step, even when linked to activities that mainstream hygiene practices, will not turn cities into healthy and clean living environments. Other elements of the sanitation chain, such as the collection, transport, treatment and safe disposal or reuse of faecal matter, will need to be taken into account, along with fostering the political duty to monitor these steps, maintain hardware, and ensure its sustainability. Yet, there is a tremendous gap between the knowledge required and the actions that will need to be taken.

As this working paper demonstrated, reaching sustainable urban sanitation for all is possible on the condition that everybody aligns with the same vision, starting with governments – all tiers of government. This poses a double challenge for governments are not only the proposed ‘champions’ – the drivers of a process of change towards a learning and improving sector – they are also one of the main entities that need transformation. Only when the public sector is aware of the need to transform itself to improve service delivery do we stand a chance to realise sustainable sanitation services provision to all city residents, in the near future.

In practical terms, making the ‘whole-system approach’ a reality requires a dedicated catalytic organisation that is seen as an honest and independent broker by all, with staff that helps plan and supports government-led processes. Based on IRC’s experience, national level processes become more effective when collaborations are fostered with institutions that set the (WASH) global agendas, both in their role as policy maker and donor role, and with relevant and influential water and sanitation organisations.

4.1 INITIATING THE CHANGE

Sanitation is about service delivery – not solely infrastructure provision. To work, it requires deepened understanding of the complex interactions

between actors, institutions and physical infrastructures, across various disciplines and governance levels. It requires, above all, government leadership and commitment, and a joint agreement on what is meant by success and how it will be measured and reported.

To build a consensus in the sector around solving specific problems requires engagement and time. The catalytic organisation needs to facilitate multi-stakeholder forums where the vision is discussed, modified, accepted, and where alternative solutions are brought forward. Consensus building is based on evidence gathered, thorough assessments of the actual situation, analysed against the expected end state of the sanitation service. It will require the integration of ideas of various urban actors such as urban planners, technical services providers, legislators and regulators, but also the private sector, civil society representatives and implementers.

The main result of the first phase will be to establish a working partnership based on trust and mutual recognition of all partners. Intangible as this may seem, this will be crucial to continue into a process of transformation of the urban sanitation sector. Only with such a full-fledged partnership will a joint vision at national level actually feed into city-wide planning perspectives that stand a chance for actual implementation.

4.2 LEARNING AND TESTING

To develop endogenous ways to deal with urban sanitation problems will be a resource- and time-intensive undertaking. This may deter many governments and donors, but the alternative – to constantly rely on the latest ‘solutions’ being parachuted in by international development experts – is hardly any cheaper. In the long run there is a need at national level for a sector that can deal with its own issues, and if necessary request for external assistance on its own terms.

The promoted ‘whole-system approach’ offers joint action research and experimenting approaches to the fore – critical components that build consensus on possible solutions. Interactions between all actors in Learning Alliances or similar forums will critically review and evaluate the successes of what worked before, take the lessons from these approaches and (re)design the appropriate tools to manage the

change. These experiments will be monitored and evaluated in relatively short feedback loops – to iteratively improve, modify and be taken up by the other actors. This is how scale can and will be realised. For this methodology to work, it will require developing the capacity of some or all stakeholders to fully participate, and a new willingness/capacity to accept iterative processes and learn from failures.

4.3 REPLICATING AND SCALE

Once the approach of working through Learning Alliances is well accepted and underway, it is important to start institutionalising the change. On the one side, embedding the experimentations in the existing private, NGOs and government/authorities systems, rules, regulations and ways of working makes scale and replication the natural next step for successful experiments. More specifically, having a government-led process means that all or most actions are implemented and tested within (or with clarity on which adaptations would be required of) the national legislative and regulatory processes and monitoring systems.

On the other side, this harmonised and coordinated way of working will deter external parties to set up their own pilot projects in isolation of the, by then, existing template for sector transformation. Alongside the move towards healthier and cleaner cities, it is envisioned that this change will lead to greater professional pride of those working in the sector and a reinforcement of national sovereignty with respect to international development experts. In this last phase, the role of the supporting catalytic organisation slowly fades away.

The goal and anticipated end result will be:

- Governments that embrace the change process will have more sustainable urban sanitation systems.
- Self-reliant systems, as the change process will take place from the inside out (note, not bottom up).
- Sector financing is more effective as trust will emerge among national (private and public) and international parties. Public finance and private finance leverage each other towards scale.
- Monitoring is ongoing and regular, and the process and tools will be flexible and geared towards adaptation.

For the international WASH sector, all of this will in practice mean that there is a need for serious engagement. Not only engagement with local partners, the private sector and NGOs, but most of all engagement with governments: local governments, national government, sector ministries, ministries of finance, and politicians (Moriarty, 2014). Engagement to help them realise that providing equitable and sustainable sanitation services to all their citizens is – in the end – part of their tasks – and then helping them to do it (ibid). This serious engagement will of course also mean holding the same actors and institutions to account: because if governments are not willing to take the lead and pay their share – universal (and equitable) access to sanitation services will remain a dream – and services will only continue to be available to the privileged.

5 References

- AMCOW, 2008. *The eThekweni Declaration and AfricaSan Action Plan*. [pdf] s.l.: Water and Sanitation Program – Africa. Available at: www.wsp.org/sites/wsp.org/files/publications/eThekweniAfricaSan.pdf.
- AMCOW, 2011. *AMCOW Country Status Overviews – Regional Synthesis Report. Pathways to Progress: Transitioning to Country-Led Service Delivery Pathways to Meet Africa’s Water Supply and Sanitation Targets*. [pdf] WA DC: Water and Sanitation Program of the World Bank. Available at: www.wsp.org/sites/wsp.org/files/publications/CSO-Synthesis-Report.pdf.
- Arbogast, B., 2014. *A Tale of Two Cities: Accra and Dakar* [blog] 30 June 2014. Available at: www.impatientoptimists.org/Posts/2014/06/A-Tale-of-Two-Cities-Accra-and-Dakar.
- Baetings, E. and van Daalen, T., 2014. *How are you and how is your loo?* [blog] 11 September 2014. Available at: www.ircwash.org/blog/how-are-you-and-how-your-loo.
- Baken, R.J., 2003. *Plotting, Squatting, Public Purpose, and Politics: Land Market Development, Low Income Housing, and Public Intervention in India*. Farnham: Ashgate Publishing, Ltd.
- Barder, O., 2014. *Is ‘the Struggle’ the Baby or the Bathwater?* [blog] 14 February 2014. Available at: www.cgdev.org/blog/struggle-baby-or-bathwater.
- Baum, R., Luh, J. and Bartram, J., 2013. Sanitation: a global estimate of sewerage connections without treatment and the resulting impact on MDG progress, *Environmental Science and Technology*, 47(4), pp.1994–2000.
- Boulouar, J., Schweitzer, R. and Lockwood, H., 2013. *Mapping sustainability assessment tools to support sustainable water and sanitation service delivery*. (Triple-S Working Paper 6) [pdf] The Hague: IRC. Available at: www.ircwash.org/sites/default/files/2013_wp6_sustainabilityassessmenttools.pdf.
- Burr, P. and Fonseca, C., 2011. *Applying the life-cycle costs approach to sanitation: Costs and service level in Andhra Pradesh (India), Burkina Faso, Ghana and Mozambique*. (WASHCost Global Briefing Note 2) [pdf] The Hague: IRC. Available at: www.ircwash.org/resources/applying-life-cycle-costs-approach-sanitation-costs-and-service-levels-andhra-pradesh.
- Burra, S., Patel, S. and Kerr, T., 2003. Community-designed, built and managed toilet blocks in Indian cities, *Environment and Urbanization*, 15(2), pp.11–32.
- Butterworth, J., McIntyre, P. and da Silva-Wells, C. (eds.), 2011. *SWITCH in the city: putting urban water management to the test*. [pdf] The Hague: IRC. Available at: www.switchurbanwater.eu/outputs/pdfs/SWITCH_in_the_city.pdf.
- Casella, D. and da Silva-Wells, C., 2014. *Seeing the forest and the trees* [blog] 26 September 2014. Available at: www.ircwash.org/blog/seeing-forest-and-trees.
- COHRE, WaterAid, SDC and UN-HABITAT, 2008. *Sanitation: A human rights imperative*. [pdf] Geneva: Centre on Housing Rights and Evictions. Available at: www.eda.admin.ch/content/dam/deza/en/documents/Themes/resource_en_171297.pdf.
- Corcoran, E., Nellemann, C., Baker, E., Bos R., Osborn, D. and H. Savelli (eds). 2010. *Sick Water?: The Central Role of Wastewater Management in Sustainable Development*. (A Rapid Response Assessment) [pdf] United Nations Environment Programme, UN-HABITAT and GRID-Arendal.
- De Albuquerque, C., 2012. *THE FUTURE IS NOW Eliminating inequalities in sanitation, water and hygiene*. [pdf] s.l.: UN Women, UNICEF and United Nations. Available at: www.ohchr.org/Documents/Issues/Water/SRWatsanInequalitiesConsultation.pdf.
- De Albuquerque, C., 2014. *Realising the human rights to water and sanitation: A handbook*. [pdf] Portugal: UN Special Rapporteur on the human right to safe drinking water and sanitation. Available at: www.righttowater.info/handbook.
- Eales, K., 2008. Rethinking sanitation improvement for poor households in urban South Africa. In: IRC, IRC Symposium: *Sanitation for the Urban Poor Partnerships and Governance*, Delft, The Netherlands, 19–21 November.
- Ekane, N., Nykvist, B., Kjellén, M., Noel, S. and Weitz, N., 2014. Multi-level sanitation governance: understanding and overcoming challenges in the sanitation sector in sub-Saharan Africa, *Waterlines*, 33(3), pp.242–56.
- Fall, P.A., Barreto, L., Zurbrügg, C. and Werner, C., 2009. NETSSAF—a multidisciplinary collaboration towards more sustainable sanitation in West Africa: main results, referred paper 257. In: WEDC – Water, Engineering and Development Centre, *Proceedings of the 34th WEDC International Conference*, United Nations Conference Centre, Addis Ababa, Ethiopia, 18–22 May 2009, pp. 178–86.
- Geels, F.W., 2006. The hygienic transition from cesspools to sewer systems (1840–1930): The dynamics of regime transformation, *Research Policy*, 35(7), pp.1069–82.

- Hawkins, P., Blackett, I. and Heymans, C., 2013. *Poor-Inclusive Urban Sanitation: An Overview*. [pdf] WA DC: The World Bank. Available at: www.wsp.org/sites/wsp.org/files/publications/WSP-Poor-Inclusive-Urban-Sanitation-Overview.pdf.
- Heijnen, M., Cumming, O., Peletz, R., Chan, G.K.S., Brown, J., Baker, K. and Clasen, T., 2014. *Shared Sanitation versus Individual Household Latrines: A Systematic Review of Health Outcomes*. [online] PloS one. Available at: www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0093300#pone-0093300-g002
- Huibers, F.P. and Van Lier, J.B., 2005. Use of wastewater in agriculture: the water chain approach, *Irrigation and Drainage*, 54(S1), pp.S3–9.
- Ingallinella, A.M., Sanguinetti, G., Koottatep, T., Montangero, A., Strauss, M., Jimenez, B., Spinosa, L., Odegaard, H. and Lee, D.J. 2002. The challenge of faecal sludge management in urban areas- strategies, regulations and treatment options, *Water Science and Technology*, 46(10), pp.285–94.
- Jenkins, M.W., Cumming, O., Scott, B. and Cairncross, S., 2014. Beyond 'improved' towards 'safe and sustainable' urban sanitation: assessing the design, management and functionality of sanitation in poor communities of Dar es Salaam, Tanzania, *Journal of Water, Sanitation and Hygiene for Development*, 4(1), p.131. Available at: www.iwaponline.com/washdev/004/0131/0040131.pdf [Accessed May 14, 2014].
- Jha, S., Rao, V. and Woolcock, M., 2007. Governance in the Gullies: Democratic Responsiveness and Leadership in Delhi's Slums, *World Development*, 35(2), pp.230–46.
- Joshi, D., Fawcett, B. and Mannan, F., 2011. Health, hygiene and appropriate sanitation: experiences and perceptions of the urban poor, *Environment and Urbanization*, 23(1), pp.91–111.
- Kvarnström, E. and af Petersens, E., 2004. *Open Planning of Sanitation Systems*. (EcoSanRes Publications Series) [pdf] Stockholm: Stockholm Environment Institute. Available at: www.ecosanres.org/pdf_files/ESR_Publications_2004/ESR3web.pdf.
- Lüthi, C., Morel, A., Tilley, E. and Ulrich, L., 2011. *Community-Led Urban Environmental Sanitation Planning – Complete guidelines for Decision-Makers with 30 tools*. [pdf] s.l.: Eawag-Sandec/WSSCC/UN-Habitat. Available at: www.eawag.ch/forschung/sandec/publikationen/sesp/dl/CLUES_Guidelines.pdf.
- McFarlane, C., 2008. Sanitation in Mumbai's informal settlements: state, slum and infrastructure, *Environment and planning A*, 40(1), pp.88–107.
- Moriarty, P. and Lockwood, H., 2014. *Everyone together for everyone forever: changing the whole system in practice* [blog] 5 March 2014. Available at: www.ircwash.org/blog/everyone-together-everyone-forever-changing-whole-system-practice.
- Moriarty, P., 2014. *No more fairy tales* [blog] 16 July 2014. Available at: www.ircwash.org/blog/no-more-fairy-tales.
- Mulumba, J.N., Nothomb, C., Potter, A. and Snel, M., 2014. Striking the balance: what is the role of the public sector in sanitation as a service and as a business? *Waterlines*, 33(3), pp.195–210.
- Murray, A. and Drechsel, P., 2011. Why do some wastewater treatment facilities work when the majority fail? Case study from the sanitation sector in Ghana, *Waterlines*, 30(2), pp.135–49.
- Nkansah, A., Fisher, J. and Khan, M.S., 2012. Manual pit emptying as a sustainable livelihood in Ghana, *Proceedings of the ICE-Engineering Sustainability*, 165(3), pp.215–21.
- Opel, A. and Bashar, M.K., 2013. Inefficient technology or misperceived demand: the failure of Vacutug-based pit-emptying services in Bangladesh, *Waterlines*, 32(3), pp.213–20.
- Parkinson, J., Lüthi, C. and Walther, D., 2014. *Sanitation 21 city wide planning framework (revised edition 2014)*. [pdf] s.l.: IWA, Eawag-Sandec and GIZ. Available at: www.uwasnet.org/Elgg/file/view/7140/sanitation-21-city-wide-planning-framework-revised-edition-2014.
- Potter, A., Klutse, A., Snehathatha, M., Batchelor, C., Uandela, A., Naafs, A., Fonseca, C. and Moriarty, P., 2011. *Assessing sanitation service level*. (WASHCost Global Working Paper 3) [pdf] The Hague: IRC. Available at: www.ircwash.org/resources/assessing-sanitation-service-levels.
- Pritchett, L. and Woolcock, M., 2004. Solutions when the solution is the problem: arraying the disarray in development, *World development*, 32(2), pp.191–212.
- Sarkar, S., Moulik, S.G. and Sen, S., 2006. *The Mumbai Slum Sanitation Program : Partnering with Slum Communities for Sustainable Sanitation in a Megalopolis*. [pdf] WA DC: World Bank. Available at: www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/01/25/000020953_20070125135506/Rendered/PDF/384560IN0Mumbai0slum01PUBLIC1.pdf.
- Schaub-Jones, D., 2011. *Winning the race : sanitation in rapidly-growing towns*, Background Paper for a Learning and Sharing Session. In: IRC, UCLGA, WIN-SA and AusAid, *Winning the Race: Sanitation in rapidly-growing towns*, Lusaka, Zambia, 10–11 November 2011.

- Schouten, T. and Moriarty, P., 2013. *The Triple-S Theory of Change*. (Triple-S Working Paper 3) [pdf] The Hague: IRC. Available at: www.waterservicesthatlast.org/content/download/2149/23603/version/2/file/2013_WP3_Theory%2Bof%2BChange.pdf.
- Scott, P., Cotton, A. and Sohail Khan, M., 2013. Tenure security and household investment decisions for urban sanitation: The case of Dakar, Senegal, *Habitat International*, 40, pp.58–64.
- Sharma, R.N. and Bhide, A., 2005. World Bank funded slum sanitation programme in Mumbai: participatory approach and lessons learnt, *Economic and Political Weekly*, pp.1784–89.
- Smet, J., 2008. Political and Social Dynamics in Upgrading Urban Sanitation a case from Colombo, Sri Lanka. In: IRC, IRC Symposium 2008 “Sanitation for the urban poor” *Partnerships and Governance*, Delft, The Netherlands, 19–21 November 2008. Available at: www.switchtraining.eu/fileadmin/template/projects/switch_training/files/Resources/Smet_2008_Urban_sanitation_in_Colombo.pdf.
- Smits, S., Moriarty, P. and Sijbesma, C., 2007. *Learning alliances: scaling up innovations in water, sanitation and hygiene*. (IRC Technical Paper Series) [pdf] Delft: IRC. Available at: www.ircwash.org/sites/default/files/Smits-2007-Learning.pdf.
- Smits, S., Galvis, A., Bernal, D.P., Visscher, J.T., Santandreu, A., de Nascimento, N.O. and Butterworth, J., 2008. Governance of urban environmental sanitation in Latin America; case studies from Belo Horizonte, Cali and Lima. In: IRC, IRC Symposium 2008 “Sanitation for the urban poor” *Partnerships and Governance*, Delft, The Netherlands, 19–21 November 2008.
- Smits, S., Da Silva Wells, C. and Evans, A., 2009. *Strengthening Capacities for Planning of Sanitation and Wastewater Use: Experiences from two cities in Bangladesh and Sri Lanka*. The Hague: IRC.
- Snowden, D.J. and Boone, M.E., 2007. A leader’s framework for decision making, *Harvard Business Review*, 85(11), p.68.
- Srivastava, B.N., 1997. *Manual Scavenging in India: A Disgrace to the Country*. New Delhi: Concept Publishing Company.
- Sugden, S., 2013. The importance of understanding the market when designing pit-emptying devices, *Waterlines*, 32(3), pp.200–12.
- Sutherland, A. da Silva Wells, C., Darteh, B. and Butterworth, J., 2012. Researchers as actors in urban water governance? Perspectives on learning alliances as an innovative mechanism for change, *International Journal of Water*, 6(3), pp.311–29.
- Sutherland, C. and Lewis, B., 2012. Water and Sanitation Service Delivery in eThekweni : a Spatially Differentiated Model. (Opinion No. 6, Chance Sustain) [pdf] Bonn: EADI – European Association of Development Research and Training Institutes. Available at: www.chance2sustain.eu/fileadmin/Website/Dokumente/Dokumente/Publications/Pub_Dec_2012/C2S_OP_No6_WP4_Water_and_Sanitation_Service_Delivery_in_eThekweni.pdf
- Taylor, K. and Parkinson, J., 2005. Strategic planning for urban sanitation—a 21st century development priority?, *Water policy*, 7(6), p.569.
- Taylor, K., Siregar, R., Darmawan, B., Blackett, I. and Giltner, S., 2013. Development of urban septage management models in Indonesia, *Waterlines*, 32(3), pp.221–36.
- The World Bank, 2012. *World Development Report 2012 Gender Equality and Development*. [pdf] WA DC: The World Bank. Available at: econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTWDR2012/0,,contentMDK:22999750~menuPK:8154981~pagePK:64167689~piPK:64167673~theSitePK:7778063,00.html.
- The World Bank and Australian Aid, 2013. *Indonesia Country Study*. (East Asia Pacific Region Urban Sanitation Review) [pdf] WA DC: The World Bank and Australian Aid. Available at: www.worldbank.org/content/dam/Worldbank/document/EAP/Indonesia/indonesia_sanitation_report.pdf.
- Tilley, E., Lüthi, C., Morel, A., Zurbrügg, C. and Schertenleib, R., 2008. *Compendium of sanitation systems and technologies*. [pdf] Dübendorf: Eawag-Sandec. Available at: www.eawag.ch/forschung/sandec/publikationen/sesp/dl/compendium_high.pdf.
- Trémolet, S. and Binder, D., 2013. *Evaluating the effectiveness of public finance for household sanitation in Dar es Salaam, Tanzania*. [pdf] London: WaterAid/SHARE. Available at: www.tremolet.com/publications/evaluating-effectiveness-public-finance-household-sanitation-dar-es-salaam-tanzania.
- Trémolet, S., Cardone, R. and Fonseca, C., 2012. Investing in urban water and sanitation systems. In: Scalr, E., Volavka-Close, N. and Brown, P., (eds) *The Urban Transformation: Health, Shelter and Climate Change*. London: Routledge.
- UN General Assembly, 2010. Resolution A/64/292.
- UN Human Rights Council, 2010. Resolution 15/9.
- UN-HABITAT, 2010. *State of the World’s Cities 2010/2011 - Cities for All: Bridging the Urban Divide*. London: Earthscan.
- Van Der Geest, S., 2002. The night-soil collector: Bucket latrines in Ghana, *Postcolonial Studies: Culture, Politics, Economy*, 5(2), pp.197–206.

- Van der Voorden, C. and Krukkert, I., (forthcoming). Behaviour, sustainability and inclusion: trends, themes and lessons in monitoring sanitation and hygiene. In: Schouten, T. and Smits, S. (eds.) *From Infrastructure to Services: Trends in Monitoring Sustainable Water, Sanitation and Hygiene Services*. Rugby: Practical Action.
- Van Vliet, B.J.M., Spaargaren, G. and Oosterveer, P., 2011. Sanitation under challenge: contributions from the social sciences, *Water Policy*, 13(6), pp.797–809.
- Verhagen, J. and Carrasco, M., 2013. *Full-Chain Sanitation Services that Last: Non-sewered Sanitation Services*, The Hague. [pdf] The Hague: IRC. Available at: www.ircwash.org/resources/full-chain-sanitation-services-last-non-sewered-sanitation-services.
- Verhagen, J., Butterworth, J. and Morris, M., 2008. Learning alliances for integrated and sustainable innovations in urban water management, *Waterlines*, 27(2), pp.116–24.
- Verhagen, J., Kvarnström, E. Nilsson, M. Srikantaiah, V. Singh, S.R.K., 2012. *The business of the Honey-Suckers in Bengaluru (India)*. [pdf] The Hague: IRC. Available at: www.ircwash.org/resources/business-honey-suckers-bengaluru-india-potentials-and-limitations-commercial-faecal-sludge.
- Von Münch, E., 2008. Sanitation and related sustainability criteria – How to indicate the quality of sanitation?. [ppt] In IWA, *IWA World Water Congress*, 7-12 September 2008. Available at: www2.gtz.de/dokumente/oe44/ecosan/nl/nl29/en-presentation-iwa-vienna-sustainability-criteria-evm-2008.pdf.
- Welle, K., Nicol, A. and van Steenberg, F., 2008. *Why is Harmonisation and Alignment difficult for donors? Lessons from the water sector*. (ODI Project Briefing 6) [pdf] London: ODI – Overseas Development Institute. Available at: metameta.nl/wp-content/uploads/2012/07/ha-in-water-sector.pdf.
- WHO – World Health Organization, 2006. *Guidelines for the Safe Use of Wastewater, Excreta and Greywater*. Geneva: World Health Organization.
- WHO – World Health Organization, 2012. *GLAAS 2012 Report: UN-Water Global Analysis and Assessment of Sanitation and Drinking-water: the Challenge of Extending and Sustaining Services*, World Health Organization. [pdf] Geneva: World Health Organization. Available at: www.who.int/water_sanitation_health/publications/glaas_report_2012/en.
- WHO/UNICEF, 2014. *Progress on sanitation and drinking-water – 2014 update*. [pdf] Geneva: World Health Organization. Available at: www.wssinfo.org/fileadmin/user_upload/resources/JMP_report_2014_webEng.pdf.
- Wright, A.M., 1997. *Toward a strategic sanitation approach: Improving the sustainability of urban sanitation in developing countries*. [pdf] WA DC: Banco Mundial. Available at: www.bvsde.paho.org/bvsasas/fulltext/toward.pdf.
- WSP – Water and Sanitation Program of the World Bank, 2007. *Water Utilities in Africa: Case Studies of Transformation and Market Access*. Nairobi: Water and Sanitation Program-Africa.
- WSP – Water and Sanitation Program of the World Bank, 2011. *Lessons in Urban Sanitation Development: Indonesia Sanitation Sector Development Program 2006-2010*. [pdf] WA DC: TheWorld Bank Group . Available at: documents.worldbank.org/curated/en/2011/05/14222627/lessons-urban-sanitation-development-indonesia-sanitation-sector-development-program-2006-2010.
- WSP – Water and Sanitation Program of the World Bank, 2014. *Fecal Sludge Management in 12 Cities – Review Findings and Next Steps*, Washington0. [pdf] WA DC: TheWorld Bank Group. Available at: wsp.org/sites/wsp.org/files/publications/WSP-Fecal-Sludge-12-City-Review-Research-Brief.pdf.
- WSUP – Water & Sanitation for the Urban Poor, 2013. *Dealing with land tenure and tenancy challenges in water and sanitation services delivery – Topic Brief*. [pdf] London: WSUP. Available at: www.wsup.com/resource/dealing-with-land-tenure-and-tenancy-challenges-in-water-and-sanitation-services-delivery.
- WSUP – Water & Sanitation for the Urban Poor, 2014. *The Urban Programming Guide: How To Design And Implement An Effective Urban Wash Programme*. London: WSUP.
- Zimmer, A. and Sakdapolrak, P., 2012. The Social Practices of Governing Analysing Waste Water Governance in a Delhi Slum, *Environment and Urbanization Asia*, 3(2), pp.325–41.
- Zurbrugg, C. and Tilley, E., 2009. A system perspective in sanitation – Human waste from cradle to grave and reincarnation, *Desalination*, 248(1-3), pp.410–17.

Annex 1: Overview of available sanitation planning approaches

There are a variety of planning tools to develop and transform urban sanitation systems. An influential approach developed by the World Bank in the late 1980s is the Strategic Sanitation Approach/Strategic Sanitation Planning; this approach has been piloted, adapted and improved over the course of time (Wright 1997; Tayler and Parkinson 2005) and has informed the Indonesia Sanitation Sector Development Project which is currently being implemented at a large scale in municipalities

throughout Indonesia (WSP 2011). Some more recent planning tools for urban sanitation, each with a different focus are authored by WaterAid, IWA, EAWAG/SANDEC and WSUP (Parkinson, et al. 2014; WSUP, 2014; Lüthi, et al. 2011). Other planning approaches not specific to urban sanitation include NETSSAF (Zurbrügg and Tilley 2009; Fall, et al. 2009) and the Open Planning of Sanitation Systems (Kvarnström and af Petersens 2004). Table 3 provides a short description of these planning approaches.

TABLE 3 OVERVIEW OF AVAILABLE SANITATION PLANNING APPROACHES

Author, Title	What and How	References
WaterAid - Urban framework and small town service delivery	Planning tools to inform WaterAid guidelines and country programmes. Situational analysis (national level and city profiling); SWOT analysis; 'governance/management triangles' analysing relationships and barriers between key actors. The urban framework contains a 2x2 prioritisation matrix looking at ease of implementation and potential impact on WASH access for the urban poor. For small towns a separate frame is available. This uses 'guiding questions' based on a 3x3 matrix (external-town-household X demographic - economic driver - autonomy/decision making. These questions are meant to facilitate planning decisions based on a local context.	WaterAid/BPD (2010) Small town water and sanitation delivery. Taking a wider view (http://www.wateraid.org/~media/Publications/small-towns-water-sanitation-service-delivery.pdf) WaterAid (2011) Urban framework, (http://www.wateraid.org/~media/Publications/urban-framework.pdf)
CLUES - Community Led Urban Environmental Sanitation (Eawag, WSSCC and UN-HABITAT)	Detailed document for planning and implementing environmental sanitation in 'disenfranchised urban and peri-urban communities'. Comprehensive 7-step planning process; with three crosscutting tasks; six elements of enabling environment; and 30 toolkits. Each planning step comes with usable tools, required outcomes and caution points. Enabling environment section describes in detail aspects to be taken into consideration to make the project work.	Lüthi, C., Morel, A., Tilley, E., Ulrich, L. (2011). Community-Led Urban environmental sanitation planning: CLUES - Complete guidelines for decision-makers with 30 tools. (http://www.susana.org/docs_ccbk/susana_download/2-1300-cluesguid.pdf)
IWA-Sanitation 21	Analysis and planning tool. New revised version consisting of five phases: 1) Build institutional commitment and partnership for planning; 2) Understand the existing context and define priorities; 3) Develop systems for sanitation improvement; 4) Develop models for service delivery; 5) Prepare for implementation.	Parkinson, J., Lüthi, C. and Walther, D. (2014), Sanitation 21. A Planning Framework for Improving City-wide Sanitation Services. IWA. Available at: http://www.sswm.info/library/8167
WSUP- The Urban Programming Guide: How to Design and Implement an Effective Urban Wash Programme	An introductory guide to urban WASH programming: how to design and implement a pro-poor urban water, sanitation and hygiene programme. The text draws primarily from WSUP's own experience and consists of various issues that need to be considered as well as practical examples. The approach consists of a section on planning, designing and influencing; developing capacity; and separate sections on water, sanitation, hygiene and crosscutting issues.	WSUP 2014 The Urban Programming Guide: How to Design and Implement an Effective Urban Wash Programme (http://www.wsup.com/resource/the-urban-programming-guide/)

Author, Title	What and How	References
Open planning of sanitation systems	Planning tool to allow for participatory methods and inclusion of stakeholders. Technology is not predetermined, but an outcome of an assessment by stakeholders according to specified criteria. Five steps toolbox: 1) Problem identification; 2) Identification of boundary conditions; 3) Terms of requirement; 4) Analysis of possible solutions; and 5) Choice of the most appropriate solution)	Kvarnström, E.; af Petersens, E. 2004 Open Planning of Sanitation Systems http://www.susana.org/docs_ccbk/susana_download/2-193-kvarnstroem-petersens-2004-planning-sanitation-systems-sei-en.pdf
NETSSAF 'Network for the development of sustainable approaches for large scale implementation of sanitation in Africa'	Seven-step framework to plan and implement sanitation programmes in sub-Saharan Africa. The focus is rural and peri-urban West Africa seven steps: 1) Participatory launch; 2) Creating demand; 3) Describing current conditions; 4) Identifying feasible services; 5) Consolidating and finalising of implementation plans; 6) Implementation; 7) Participatory monitoring and evaluation	NETSSAF 2008 Participatory planning approach: A guideline for sustainable sanitation planning (http://www.netssaf.net/fileadmin/Files/Documents/Public_Library/D46.pdf)
Strategic Sanitation Approach (SSA)	WSP/UNEP approach to develop and implement sanitation systems. Based on assessment, planning and implementation. There are two main pillars: First the System is to be unbundled both vertically (responsibilities and duties), as well as horizontally (geographical location). The other pillar is practicality/feasibility: the programme must be grounded in local reality, take small steps towards a larger goal (which should be well-defined, not more pilot projects), and policy and practice need to be interlinked (preferably practice should inform policy).	Tayler, K. and Parkinson, J. (2005) Linking strategy and practice in urban sanitation Kevin Tayler, (1998) Strategic Sanitation in South Asia. (wedc.lboro.ac.uk/resources/conference/24/Tayler.pdf) WSP (2011) Lessons in Urban Sanitation Development: Indonesia Sanitation Sector Development Program 2006-2010, (http://documents.worldbank.org/curated/en/2011/05/14222627/lessons-urban-sanitation-development-indonesia-sanitation-sector-development-program-2006-2010 .)

Visiting address

Bezuidenhoutseweg 2
2594 AV The Hague
The Netherlands

Postal address

P.O. BOX 82327
2508 EH The Hague
The Netherlands

T +31 70 3044000
info@ircwash.org
www.ircwash.org