

Comparison of tools & approaches for urban sanitation

September 2016

Introduction

Urban sanitation is notoriously complex, as you not only have to worry about demand and supply for sanitation services, but also about other sectors (planning, housing, health, other infrastructure...), and it is critical to safely manage safely the whole sanitation chain.

In recent years, many approaches have been developed to understand and address urban sanitation, from formal planning to more community-led processes. Many tools have also been developed, for example famous ones like the Shit-Flow Diagrams (SFDs) which graphically represent the estimated volumes of faecal matter safely managed or not. Many tools focus on non-sewered sanitation, such as decentralised systems and faecal sludge management (FSM).

We can easily be lost in this multitude, without knowing how to decide which tools or approaches to adopt.

This document is therefore a quick review of approaches and tools available for urban sanitation as of mid-2016, along with who created them, how they work, what can be their main use and limitations, and known examples (including any use in WaterAid). It includes:

- **Approaches**, i.e. ways of approaching urban WASH services.
- **Diagnostic tools**, used for understanding the situation (physical, political...)
- **Prioritisation tools**, to know what to do next, once a diagnostic is done.
- **Planning and decision-making tools**, used to choose technologies or financial options.

There are also examples of use of such tools and approaches in WaterAid, described in short case studies for Ethiopia, Mozambique and Cambodia.

This document is based on

- Rémi Kaupp's own research in August 2016
- Tracey Keatman and Ken Caplan (Partnerships in Practice), 2016, [City sanitation planning – Research](#) – Phase 1 Literature Review
- The WaterAid case studies linked below.

Contents

| | |
|--|----------|
| Approaches | 2 |
| Tools | 3 |
| Diagnostic tools | 3 |
| Prioritisation tools | 3 |
| Planning & decision-making tools | 4 |
| WaterAid Case studies | 5 |
| Ethiopia – Shit-Flow Diagrams..... | 5 |
| Mozambique – City-wide water and sanitation plans..... | 6 |
| Cambodia | 7 |
| What some tools look like | 8 |

Approaches

| Approaches | Description | Use | Limits | Examples |
|--|--|---|--|---|
| City Sanitation Plans (CSP) Various actors | Blanket term for a range of approaches, involving strategic planning processes for citywide sanitation service development. They draw on fundamentals of earlier planning approaches and take a holistic approach to planning, addressing both technical (e.g. services) and non-technical (e.g. institutional capacity) aspects of urban sanitation. They provide in-depth guidelines and strategies (developed by several supporting organisation, e.g. WSP's City-Wide Sanitation Strategy). | Work well with the mentality of many urban planners and large funders. | Collaborative planning may be unfamiliar, and it is easy to revert to top-down supply-driven planning. | Indonesia WA: 4 cities planning |
| Community-Led Urban Environmental Sanitation (CLUES) EAWAG (2011) | CLUES built on lessons learnt from implementing household-centred environmental sanitation. CLUES includes water, solid waste management and storm drainage in addition to sanitation. It is a 7-step approach including: demand creation, planning inception, situational analysis, problem prioritisation, identification of service options, developing an action plan, and implementing the action plan. Cross cutting these steps are: communication, capacity development and monitoring and evaluation. | Implement participatory planning for sanitation, through tested methods. | Potentially time-consuming planning. Needs good facilitation. Assumes self-financing by communities. Needs strong leadership. | Nala, Nepal |
| Sanitation 21 IWA (2005 and 2014) | A framework that attempts to refocus sanitation planning by thinking about wider objectives, against business as usual. The steps include building partnerships, context definition, identifying technical options and feasibility, but leaves detailed planning to existing tools. | Diagnostics of existing systems , and federating actors around sustainable sanitation. | Unclear if it has been used much in practice; doesn't provide much guidance for planning. | N/A |
| Citywide pathway to sanitation Developed in USAID's SUWASA programme (2015) | Provides a 9-step "pathway" for improving management of urban sanitation encouraging authorities to: assess existing services and the socio-economic context; map stakeholders; build consensus for action and define roles; create a short-term FSM plan and a longer-term investment plan; and mobilise investments. | Sequence the work , think city-wide and about the various stakeholders, and think about finance. | The pathway itself doesn't tell you how to address issues, and the examples are weak for short-term work. | Juba (almost all steps) |
| Whole System Approach (WSA) IRC (2014) | Used a systems thinking approach to focus on "everything" by considering institutions, whole chains, service provision, leadership and monitoring. It involves a 3-phased approach: 1) initiating change – situational assessments, planning, developing partnerships; 2) learning and testing – action based research and pilot projects, capacity development; and 3) replicating and scaling up – systematic changes led without external support, and monitoring. | Integrate work with other sectors and think about long-term services | Focused on external actors' inputs – useful for NGOs but possibly less for city officials. Systems thinking needs to be 'primed' when it doesn't come naturally. | N/A? |

Tools

This includes tools designed specifically for urban sanitation, but not underlying data collection tools (surveys, stakeholder mapping and so on). Green cells are part of the [World Bank FSM tools](#) series, developed by the World Bank, OPM, WEDC (2016).

Diagnostic tools

| Tool | Description | Use | Limits | Examples |
|---|--|--|--|---|
| Shit-Flow Diagrams (SFD) Promoted by GIZ and Gates | SFDs are a useful tool to inform urban sanitation programming and communicate visualizing how excreta physically flows through a city or town. It shows how excreta is or is not contained as it moves from defecation to disposal or end-use, and the fate of all excreta generated. An accompanying report describes the service delivery context of the city. They offer an innovative way to engage city stakeholders like political leaders, sanitation experts and civil society organizations in a coordinated dialogue about excreta management. | City-wide diagnostic ; useful for engaging stakeholders, advocacy (especially realising the limits of the current system, if perceived 'good enough'). Useful diagram to introduce the topic. | Not a scientific analysis of volumes; usually not for directly planning as it misses causal factors, geography, etc. | Dar es Salaam SFD World Map WA: Ethiopia in 5 towns |
| City Service Delivery Assessment for FSM (CDSA) | Assesses what policies, laws, institutions, processes and budgets exist for FSM services, and where gaps are. Assess the local enabling environment and quality of service delivery along the sanitation service chain, identifying areas for attention. Produces a scorecard. | Diagnostic of the local enabling environment, distinguishes its complexities. | Identifies areas of action, but not what to do. | Balikpapan |
| Prognosis for Change (PFC) | "Why is it like this? Who benefits, who loses out? What factors could facilitate improvement of the services?" Identify the interests and incentives that could block action, and possible entry points for overcoming them | Diagnostic: Political economy analysis | Best if linked with previous tool; hard to find good consultants. | Dhaka |
| Faecal waste rapid assessments IRC (2015) | IRC's alternative to the SFDs and CDSAs, designed to fit with IRC's Whole System Approach. | Diagnostic: FSM situation and ecosystem. | | Still being tested WA: Cambodia in Siem Reap |
| Urban Sanitation Status Index (USSI) Developed in 2015 | Uses composite indicators across the sanitation chain, and mixture of household surveys and focus groups, to map scores in different neighbourhoods of the city. | Diagnostic: mapping across the sanitation chain. | Methodology is not public. | Maputo (Annex 2) |

Prioritisation tools

| Tool | Description | Use | Limits | Examples |
|--|---|---|--|---|
| SaniPath Emory (2014) | The tool assesses exposure to faecal contamination in urban, low-income settings. The results of this assessment can be used to characterize a neighbourhood or city according to a matrix of faecal exposure pathways. The outputs serve as a simplified, but still informative, means of identifying priorities for sanitation investments or interventions | Prioritisation given health issues. See is it for me? | Localised – can prevent city-wide thinking. May not tell new things if an SFD exists. Can be academic. | Accra WA: Cambodia in Siem Reap |

| Tool | Description | Use | Limits | Examples |
|---|--|--|---|------------------------------|
| Sanitation Safety Plan (SSP) WHO (2014) | Brings health and sanitation sectors to map contamination pathways and highlight risks and priority interventions areas (geographical and/or sectoral). Uses WHO guidelines for wastewater and excreta management as a starting point. | Prioritisation and linking with health professionals. | Focuses more on describing the system and monitoring risks than improving it. | South Africa |
| Service Delivery Action Framework | "Which aspects of the enabling environment need development next?" Guide identification of actions in relation to the enabling environment, necessary to deliver desired results | Decision-support: prioritisation ("what next") | | Dhaka |

Planning & decision-making tools

| Tool | Description | Use | Limits | Examples |
|---|--|--|---|----------------------------------|
| SaniPlan CEPT and PAS (2015) | An Excel-based decision support tool, looking at city sanitation through 1) performance assessment, 2) planning and 3) financial planning. A distinct version has been made for FSM. | Decision support , towards a practical plan | Focused on India | Wai |
| FSM Toolbox Asian Institute of Technology (2016) | A collection of tools designed for city sanitation planners and associated consultants, following a typical city sanitation planning process. It comes with many guidelines , example contracts and ToRs , and training modules , and as such is more a library of practical documents along the way | Planning , especially going through practical steps and documents for planners. | Many tools and documents are still missing. | N/A |
| Septage Management Decision Support MWH for Oxfam with USAID funding (2015) | An Excel-based tool to determine the main elements of an FSM plan, such as quantities to collect, a collection plan, CapEx and OpEx of collection, transport and treatment, and suitable tariffs. | Planning , based on financial analysis | Very numerical, to be used after agreement to proceed with a plan. Needs good input data. | Philippines |
| Cost-effectiveness and options assessment UTS-ISF (2007-10) | Process to compare options for sanitation / wastewater on the basis of cost-effectiveness (original report) and sustainability (as in the Can Tho case study). It combines technical, financial and geographical analysis, to provide a ranking of options and inform investment. | Technology choice , based on sound assessment and ranking; use utilities' language. | Needs good input (e.g. for wastewater flows) | Can Tho, Vietnam |
| Intervention Options Assessment | Guide for identification of technical interventions along the service chain – linking to program design guidelines. | Technology choice | | Dhaka |
| SaniTech CSTEP (2015) | Tool for assessing sanitation technology options in Indian cities, based on GIS data, socio-economic data, and physical conditions, using a range of possible systems. | Technology choice , for Indian planners | Cost-benefit analysis remains limited. | Demo city |
| Integrated design approach for FSM Being developed by EAWAG | Tools under development to favour the reuse of sludge products, by looking: marketing; siting treatment plants given collection and transport; optimise treatment for recovery; characterise FS; and lab methods | Technology choice (for recovery) | Very centred on resource recovery, which may not be the main priority. | N/A (under development) |

WaterAid Case studies

Ethiopia – Shit-Flow Diagrams

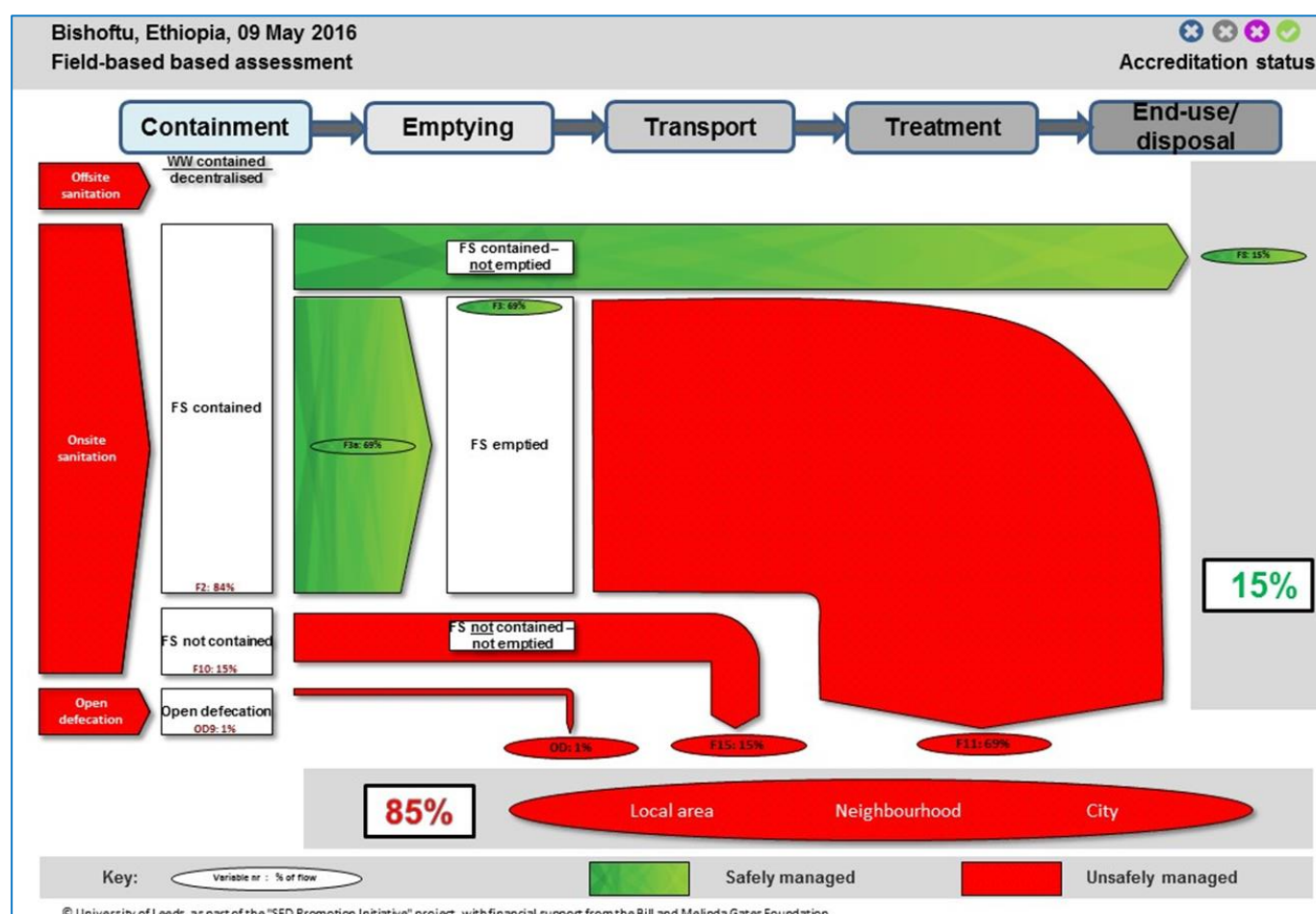
See the [detailed presentation](#).

WaterAid has arranged a partnership between Yorkshire Water (a UK-based water company) and the water providers in 20 Ethiopian towns. As part of this partnership, in order to devise medium-term sanitation plans in five of these towns, an assessment of the situation was conducted by using Shit-Flow Diagrams (SFDs). They were prepared in early 2016 by the University of Leeds, itself part of a consortium devising SFDs around the world, with funding from the Bill and Melinda Gates Foundation.

Typically, SFDs are used to shift the thinking from a localised to a city-wide level; to raise awareness of (the lack of) excreta management and can be linked to health issues; prioritise interventions and especially put the focus on on-site sanitation and whole sanitation chain thinking; trigger discussions with planners and engineers to see how to serve poorer areas.

In Ethiopia, SFDs have been conducted in Bishoftu (diagram below), Bure, Bahir Dar, Holleta and Axum. They have provided some surprising insights, for instance the impact of poorly managed hotel toilets in the touristic city of Bishoftu, the impact on the drainage system, and the initiatives which already exist such as biogas production.

As a result, the SFDs have allowed discussions with the utilities and municipalities, who have expressed increased interest in prioritising sanitation, especially on-site solutions, have been able to see which areas need urgent attention, and where capacity building is most needed.



Mozambique – City-wide water and sanitation plans

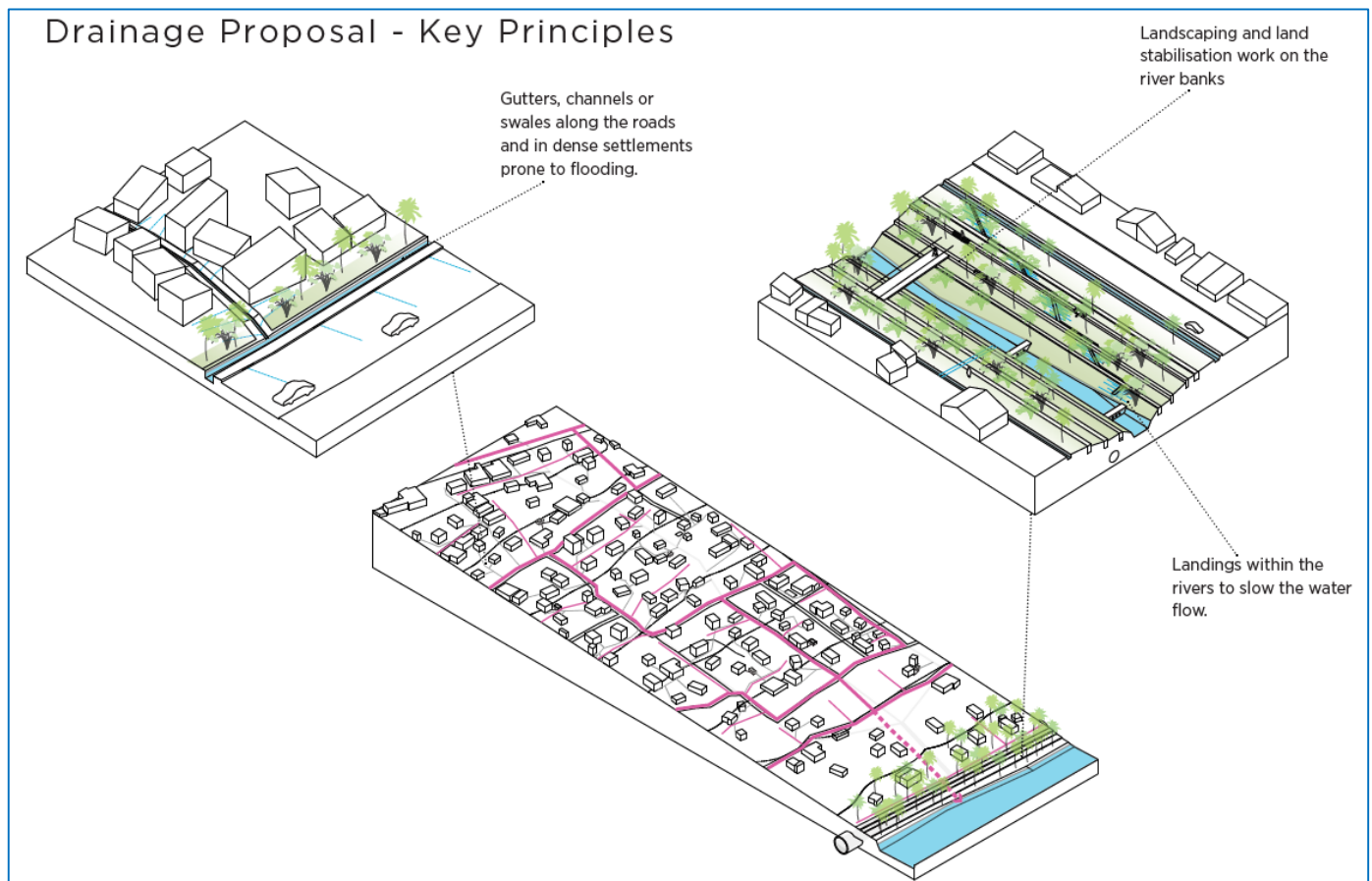
See the more detailed [briefing note](#).

In Maputo, and in three other African cities (Lagos, Lusaka and Kinshasa), we have engaged with local municipalities in a project to analyse the state of water and sanitation infrastructure and the future plans for investment. Taking a city-wide perspective, we have worked closely with UK architects Sheppard Robson to propose ways forward. Whilst focusing on water and sanitation infrastructure, the approach has included other sectors and considered the effects of climate change, drainage, population growth, and so on.

The main aim is to support local authorities in visioning their infrastructure in the long-term, especially for the poorest living in unserved and peri-urban areas. The process involved initial research, for instance to take stock of existing masterplans; design of proposals for infrastructure development; consultations with local stakeholders and with donors; and consolidation using feedback.

In Maputo, climate change – through its impact on sea-level rise, flooding and saline intrusion – is a particular concern and has meant proposals for flood defences had to be integrated. The Maputo authorities have expressed formal support for the proposals, and the report was used to write the terms of reference for the tender of the regional sanitation and drainage masterplan.

This process is also being replicated in smaller Mozambican towns (Boane, Quelimane and Cuamba) as part of district-wide improvements of water and sanitation services.



Cambodia

SaniPath

See the [detailed presentation](#).

WaterAid Cambodia is using the SaniPath tool, with assistance from its creators Emory University, in Siem Reap, the third largest city. They are especially focusing on two informal settlements and their surroundings to learn about most significant transmission pathways for faecal contamination. SaniPath complements tools like shit-flow diagrams in the sense that it links physical and engineering information with health data.

Through this methodology, environmental samples are collected and behaviours are surveyed, to understand the pathways through which diseases spread. The method also shows how residents in better-off areas are affected by poor sanitation in neighbouring informal settlements. This in turn will inform the city governor and the national authorities on why and how the city can be cleaned, and what should be prioritised.

Faecal waste rapid assessment

See the [detailed presentation](#).

WaterAid Cambodia is also testing this tool in Siem Reap; this one allows a city-wide vision, through:

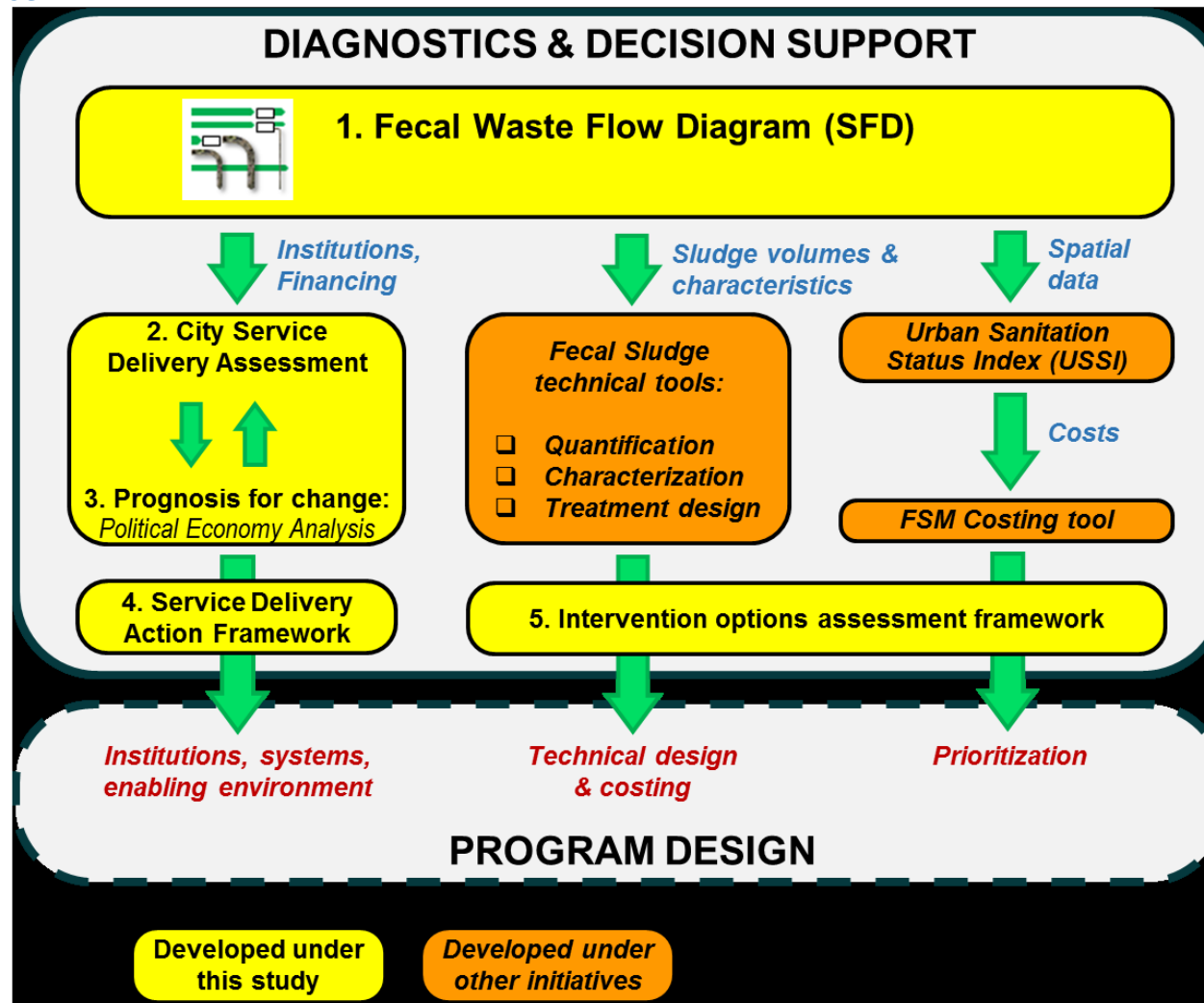
1. The creation of a faecal sludge diagram, showing the quantities treated or not, which gives an idea of the magnitude of the issue, and identify the weakest links in the sanitation chain;
2. An assessment of the performance and the governance of sanitation in the city. This includes finance, institutional mandates, regulatory framework, etc. in order to identify how the enabling environment can be improved.

The combination of this tool and SaniPath therefore allow both a broad city-wide view and a more scientific approach in selected settlements, for better decision-making.

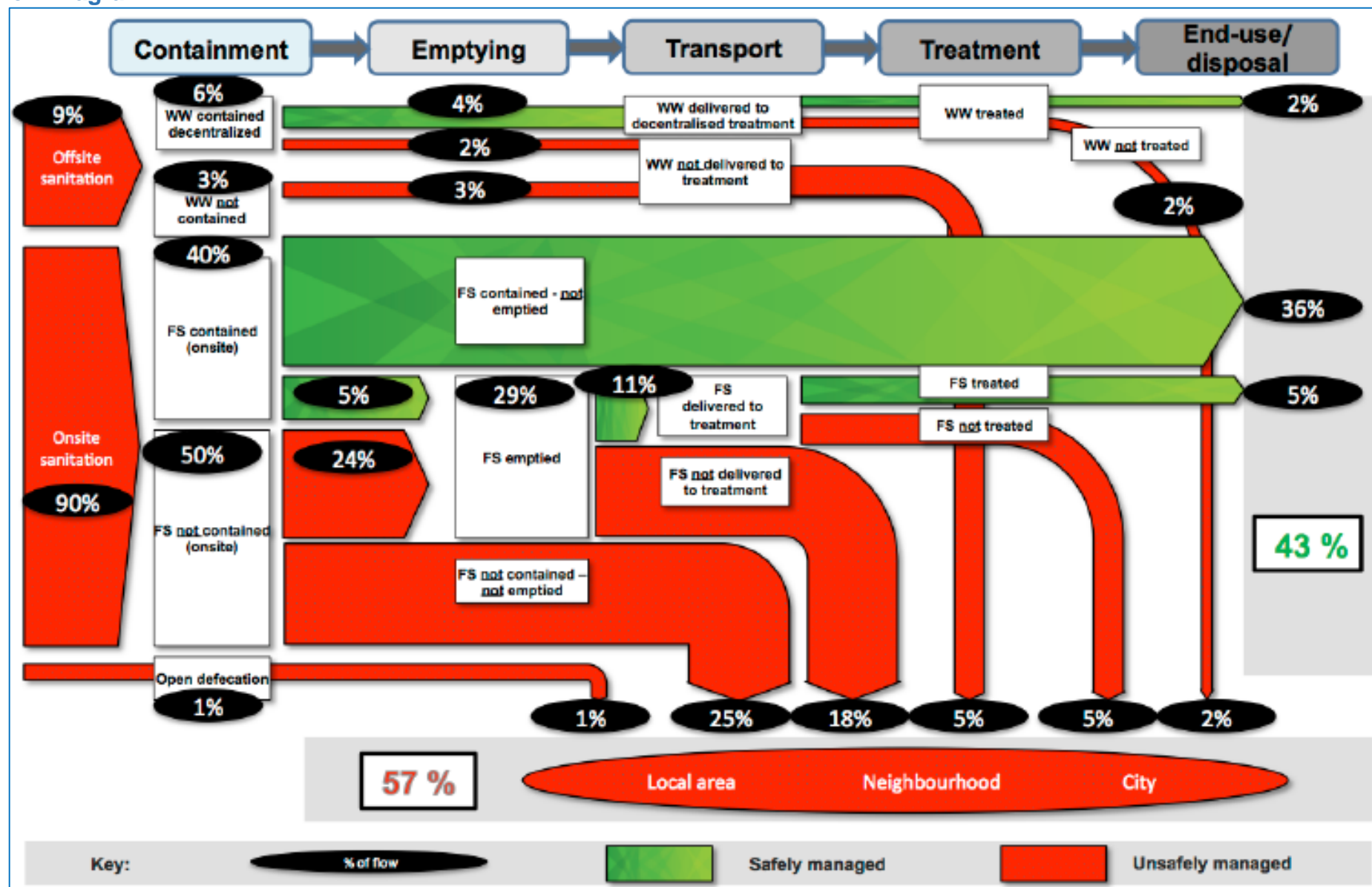
The next stages, once both studies are done, will be to plan services and urgent intervention areas, together with large donors, like the French Agency for Development.

What some tools look like

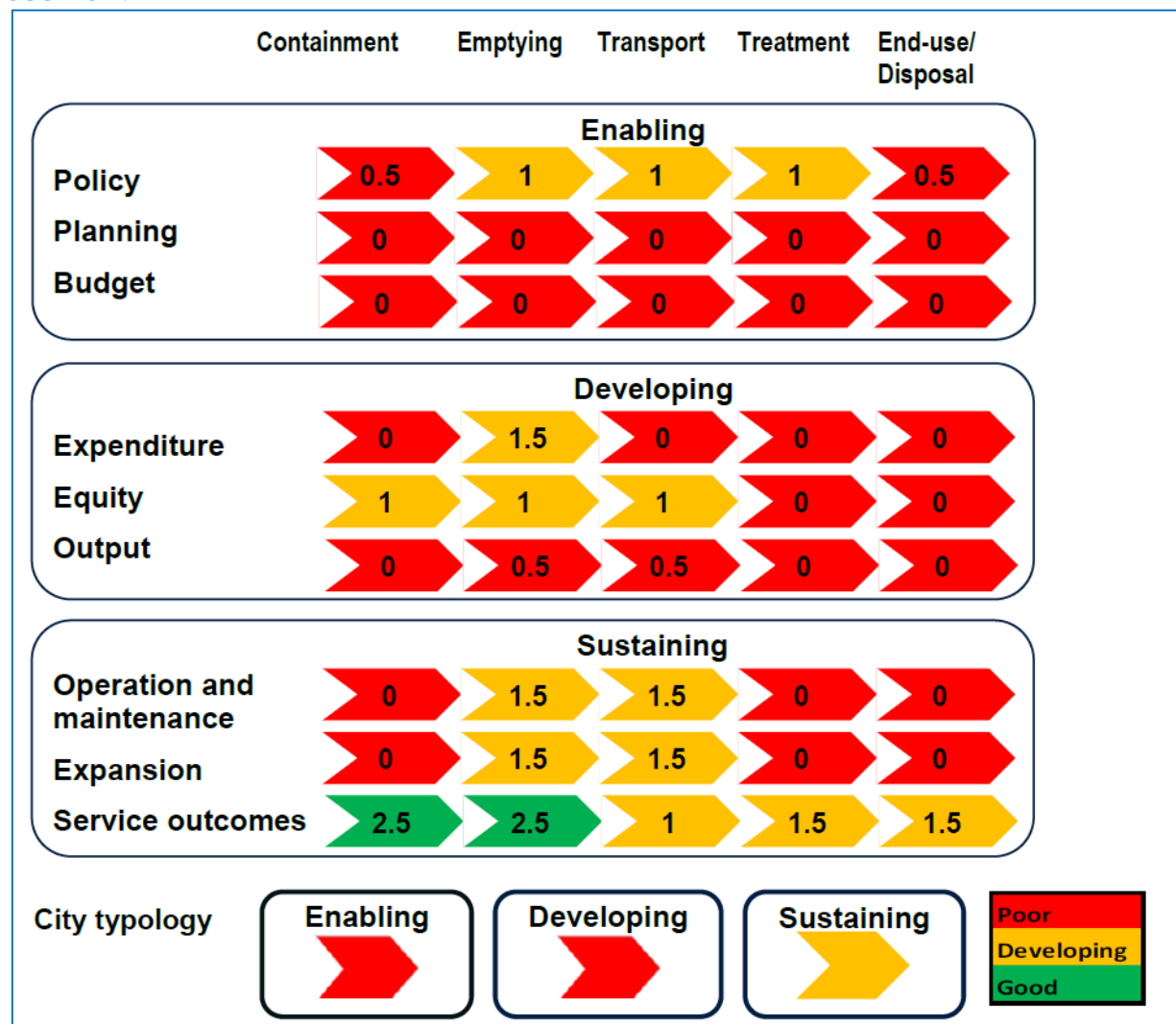
World Bank FSM tool series



Shit-Flow Diagram

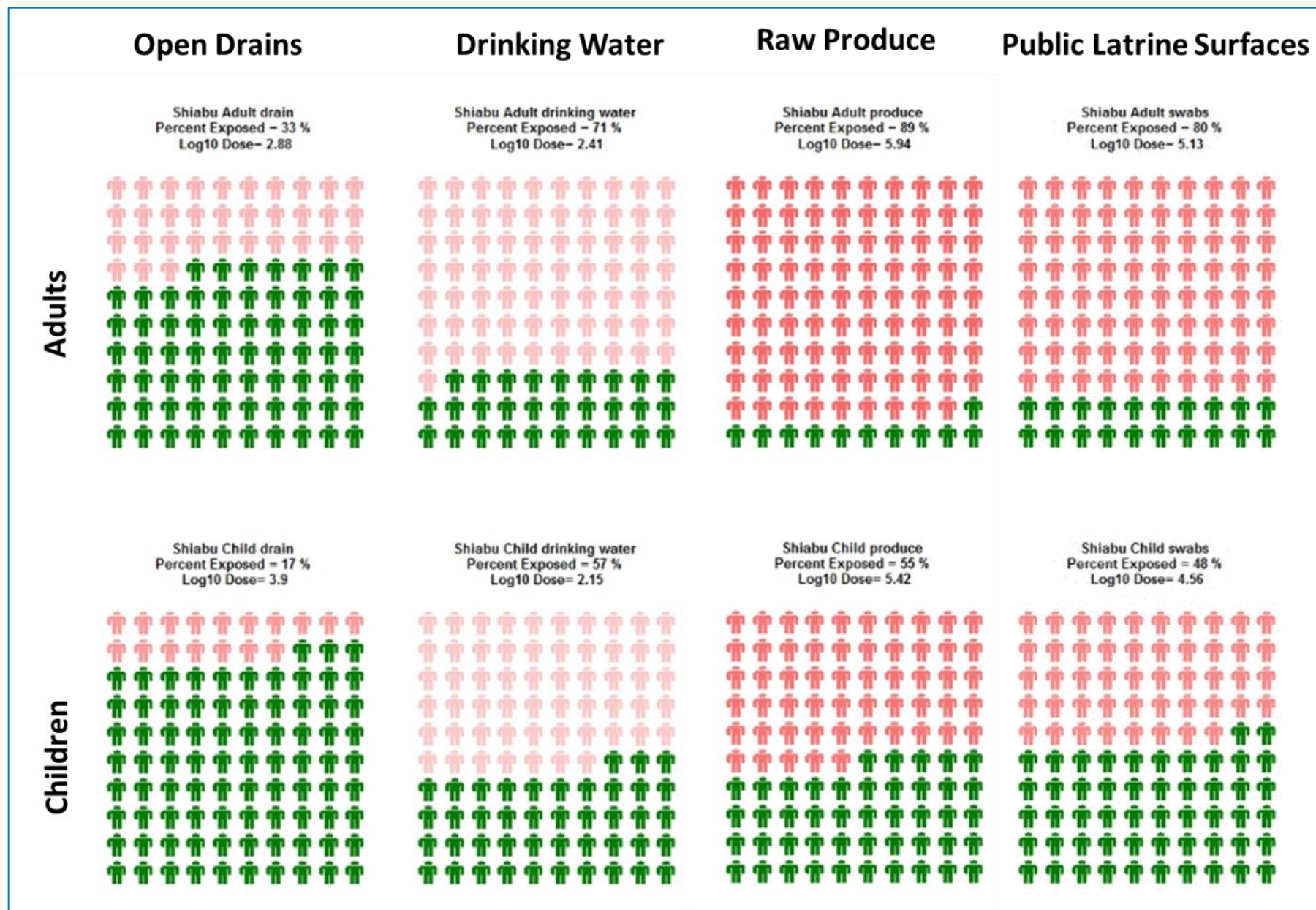


City Delivery Services Assessment



Service Delivery Action Framework

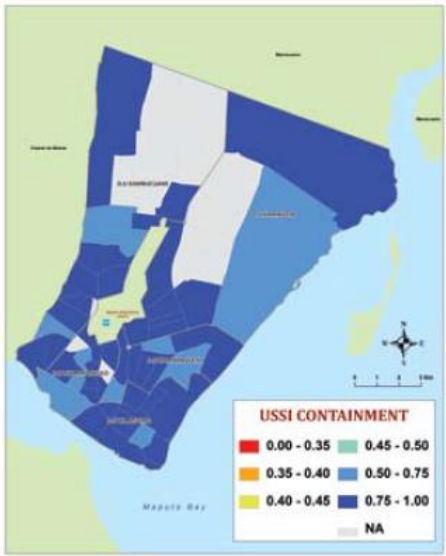
| Stages of action | | Basic actions <i>Critical interventions for public health protection</i> | Intermediate actions <i>Strengthening existing foundations</i> | Consolidating actions <i>Focused on full-chain, sustainable services</i> |
|------------------|---|--|--|---|
| National | Policy, legislation and regulation | <ul style="list-style-type: none"> Review national sanitation policy and ensure FSM is included Review regulatory framework around the protection of public health & environment | <ul style="list-style-type: none"> Set norms / standards for public health and environmental protection Establish legal basis for regulation of FSM services | <ul style="list-style-type: none"> Require local regulation and its enforcement Develop a policy/regulatory framework to incentivize treatment and re-use options |
| | Institutional arrangements | <ul style="list-style-type: none"> Review institutional arrangements for sanitation – ensure FSM is included Identify an institutional framework for FSM with clear roles and coordination | <ul style="list-style-type: none"> Establish institutional framework for FSM with defined roles and coordination mechanisms Establish institutional roles for fecal sludge treatment and re-use options | <ul style="list-style-type: none"> Strengthen institutional framework to enhance service outcomes, with fully implemented roles and coordination Consider (dis)incentives for improved FSM |
| | Planning, monitoring and evaluation | <ul style="list-style-type: none"> Build awareness of FSM in national planning entities and relevant sector ministries (works, housing, health, environment, etc.) | <ul style="list-style-type: none"> Establish monitoring framework for service standards – focus on emptying services Establish systems to evaluate service quality | <ul style="list-style-type: none"> Strengthen monitoring of all services Develop plans to enhance treatment capacity and re-use technologies |
| | Capacity and TA* | <ul style="list-style-type: none"> Identify scale of the capacity gap and TA required to address FSM service needs | <ul style="list-style-type: none"> Build public and private sector capacity for city-wide FSM services | <ul style="list-style-type: none"> Strengthen sector capacity for services, including treatment & re-use markets |
| | Financing | <ul style="list-style-type: none"> Build awareness and agreement around the budgetary requirements for FSM services | <ul style="list-style-type: none"> Develop programs with FSM funding windows and incentives for cities | <ul style="list-style-type: none"> Mobilize finance for FS processing, re-use and disposal |
| Local | Legislation and enforcement | <ul style="list-style-type: none"> Review/establish byelaws, ensuring they address on-site systems and FSM services | <ul style="list-style-type: none"> Strengthen byelaws and their enforcement Introduce regulation of service providers Incentivize disposal at recognized sites | <ul style="list-style-type: none"> Regulate pollution of receiving waters Penalties for indiscriminate FS dumping Enforce use of emptyable facilities |
| | Institutional arrangements | <ul style="list-style-type: none"> Review institutional arrangements for sanitation – ensure FSM is included Identify local institutional framework for FSM | <ul style="list-style-type: none"> Establish local institutional framework for services – with roles defined and agreed Establish roles for FS treatment and re-use Consider (dis)incentives for improved FSM | <ul style="list-style-type: none"> Strengthen institutional roles for managing improved FS management, including treatment facilities and re-use options Implement (dis)incentives for improved FSM |
| | Planning, monitoring and evaluation | <ul style="list-style-type: none"> Conduct area-based, gender and pro-poor focused diagnostic studies Develop plans, finance & institutional needs Plan and design FS treatment options | <ul style="list-style-type: none"> Establish revenue streams Refine and implement local service plans Establish monitoring and evaluation (M&E) of service standards | <ul style="list-style-type: none"> Introduce plans to enhance treatment capacity and re-use arrangements Strengthen M&E of treatment and re-use arrangements against service standards |
| | Promotion | <ul style="list-style-type: none"> Stimulate customer demand/ WTP for FSM | <ul style="list-style-type: none"> Disseminate public FSM services information | <ul style="list-style-type: none"> Stimulate market demand for re-use of FS |
| | Capacity and technical assistance* (TA) | <ul style="list-style-type: none"> Identify capacity gaps and required TA Promote appropriate private sector services Implement measures for safer disposal of FS currently dumped in the environment | <ul style="list-style-type: none"> Promote/support development of improved, emptyable containment facilities Strengthen role of service providers Pilot scheduled desludging/ transfer stations | <ul style="list-style-type: none"> Consolidate/expand services based on outcome of pilot studies Build/rehabilitate FS processing plants and develop business models for re-use of FS |
| | Financing | <ul style="list-style-type: none"> Identify the extent of financing required to address service improvements to the poorest | <ul style="list-style-type: none"> Introduce specific pro-poor financial arrangements (such as targeted subsidies) | <ul style="list-style-type: none"> Identify opportunities for financial flows generated from the sale of FS end products |
| Users | Planning | <ul style="list-style-type: none"> Consult communities, identify needs & wants | <ul style="list-style-type: none"> Gain user feedback on improved services | <ul style="list-style-type: none"> Gain user opinions on re-use options |
| | Tenant sanitation | <ul style="list-style-type: none"> Engage with / consult landlords and tenants on constraints to FSM services | <ul style="list-style-type: none"> Develop assistance and enforcement packages for landlords | <ul style="list-style-type: none"> Focus on enforcement of service quality for landlords |



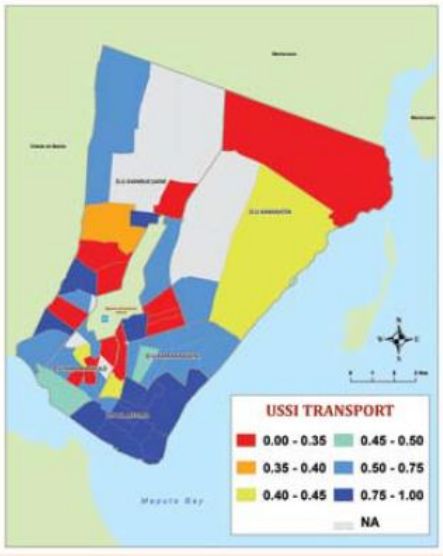
IRC's faecal waste rapid assessment

| Summary of FAECAL SLUDGE flows | | | | | | | | |
|---|----------|---------|-------------|----------|-----------|-----------|----------|-------|
| | Produced | Capture | Containment | Emptying | Transport | Treatment | Disposal | Reuse |
| Totals in m ³ | 37,595 | 37,595 | 37,495 | 35,000 | 16,800 | 350 | 175 | 175 |
| Totals in % | 100.0% | 100.0% | 99.7% | 93.1% | 44.7% | 0.9% | 0.5% | 0.5% |
| Safe | | 99.7% | 93.1% | 44.7% | 0.9% | 0.0% | 0.0% | 0.0% |
| Unsafe | | 0.3% | 6.6% | 48.4% | 43.8% | 0.9% | 0.5% | 0.5% |
| | | | | | | | | |
| Overview of faecal waste management related score cards | | | | | | | | |
| | Overall | Capture | Containment | Emptying | Transport | Treatment | Disposal | Reuse |
| Planning | 0% | | | | | | | |
| Budgets | 0% | NA | | NA | NA | NA | NA | NA |
| Standards | | 0% | | 0% | 0% | 0% | 0% | 0% |
| Permits | | 0% | | 0% | 0% | 0% | 0% | 0% |
| Safety | | N/A | | 0% | 0% | N/A | N/A | N/A |
| Notes: NA = Not Available; N/A = Not Applicable | | | | | | | | |

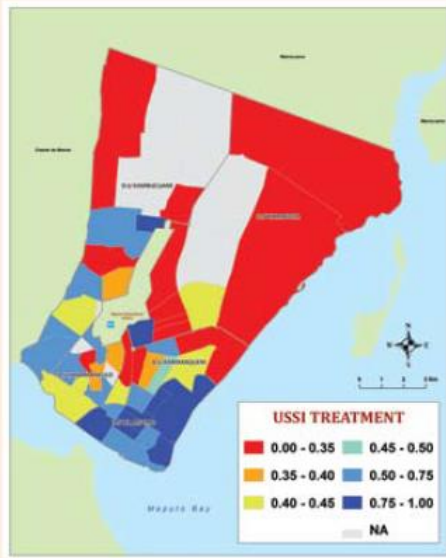
FIGURE 4: USSI COMPONENTS



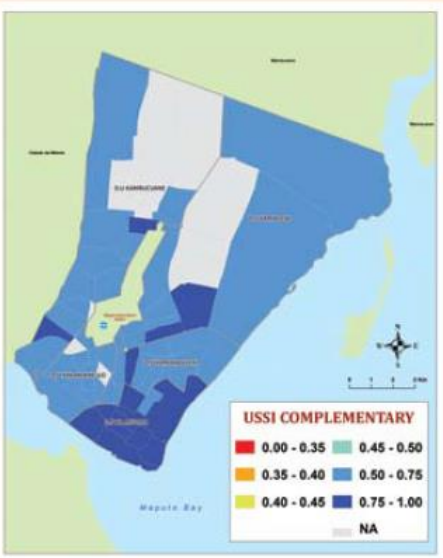
(a) Containment Status



(b) Emptying and Transport status



(c) Treatment and Final Disposal



(d) Complementary Services (solid waste, drainage)

FSM Toolbox

