EXPLORING PROMISING AFRICAN EXAMPLES OF NON-SEWER AND FECAL SLUDGE MANAGEMENT SYSTEMS FOR WIDER SHARING AND FUTURE REPLICATION (AfWA/FABRI Project)

REPORT ON SANITATION SECTOR STATUS IN THE AFRICA REGION

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ACRONYMS

AdeM	Maputo Water Utility	NGO	Non Governmental organization
AfWA	African Water Association	NGOs	Non-Governmental Organizations
AGER	General Regulation Authority of Sao Tome and Principe	NWASCO	National Water Supply and Sanitation Council
AMCOW	African Ministers Council on Water	OD	Open Defecation
BMGF	Bill and Melinda Gates Foundation	ODF	Open Defecation Free
CAR	Central African Republic	ONAS	Office National de l'Assainissement du Sénégal (National Sanitation Office of Senegal)
CFAF	CFA Francs	ONEA	Office National pour l'Eau et l'Assainissement (National Office of Water & Sanitation)
CLTS	Community Led Total Sanitation	PDEA	Master Plan for Water and Sanitation Systems in Sao Tome and Principe
CRA	Water Regulatory Council	PNADD	National Plan for the Environment and Sustainable Development in Sao Tome and Principe
CUs	Commercial Utilities	PNDS	National Health Development Plan in Sao Tome and Principe
DNA	Designated National Authorities	PRONASAR	National Rural Water Supply and Sanitation Program
DRC	Democratic Republic of Congo	PSSAC	Politique Sous-Sectorielle de l'Assainissement Collectif du Togo (Sub-Sectorial Policy of Collective Sanitation of Togo)
DWA	Department of Water Affairs	SANDEC	Department Sanitation, Water and Solid Waste for Development
DWRD	Department of Water Resources Development	SDGs	Sustainable Development Goals
EAWAG	Federal Institute for the Development, Treatment and Protection of Water	SEPO	Success, Failure, Potential and Obstacle
ECOSAN	Ecological Sanitation	SME	Small and Medium Enterprise
EECAS	Economic Community of Central African States	SONEB	Société Nationale des Eaux du Bénin (National Water Company of Benin)
ELISAL (Angola)	Empresa de Saneamento e Limpeza de Luanda, Lda	SONILS Ltd	Sonangol Integrated Logistics Services (Angola)
FABRI	Further Advancing the Blue Revolution Initiative	STC	Scientific and Technical Council
FIPAG	Water Investment Fund	UNFCCC	United Nations Framework Convention for Climate Change
FS	Fecal Sludge	UNICEF	United Nations Children's Fund
FSM	Fecal Sludge Management	USAID	U.S. Agency for International Development
FSTP	Fecal Sludge Treatment plant	USD	United States Dollars
GDP	Gross Domestic Product	WAB	Water Appointment Board
GDP	Gross Domestic Product	WARMA	Water Resources Management
IDH	Human Development Index	WASCOP	Water and Sewerage Company
IDWSD	International Drinking Water Supply and Sanitation Decade	WASH	Water Sanitation and Hygiene
INGO	International Non-Governmental Organizations	WHO	World Health Organization
JMP	Joint Monitoring Program	WOP	Water Operators Partnership

LAs	Local Authorities	WRC	Water Research Commission
LEWA	Lesotho Electricity and Water Authority	WSA	Water Services Authority
M&E	Monitoring and Evaluation	WSP	Water Service Providers
MDGs	Millennium Development Goals	WSR	Water Sector Reform
MK	Malawi Kwacha	WSS	Water Supply and Sanitation
MOC	Communal Project Management	WUC	Water Utility Corporation
MoF	Ministry of Finance	WWTP	Waste water Treatment plant
MoH	Ministry of Health		
NDC	National Development Corporation		

EXECUTIVE SUMMARY

This report presents a synthesis of results of a rapid assessment of the state of fecal sludge management (FSM) in 31 countries across Sub-Saharan Africa, including: Angola, Ethiopia, Zambia, Benin, Burundi, Kenya, Botswana, Burkina Faso, Cameroon, Malawi, Lesotho, Cote d'Ivoire, Central African Republic, Tanzania, Mozambique, Gambia, Congo, Uganda, South Africa, Guinea, Chad, Namibia, Mali, Gabon, Mauritania, Equatorial Guinea, Nigeria, Democratic Republic of the Congo, Senegal, Sao Tome and Principe, and Togo.

This assessment sought to determine the capacity of key sanitation service operators with a view to identifying candidates for an anticipated mentorship program. FSM in the context of this report refers to the activities required for the safe containment, collection/emptying, transportation, treatment and disposal/ reuse of fecal sludge (FS). Efforts to improve fecal sludge management in sub-Saharan Africa have recently been scaled up mainly in low-income urban settlements where the FSM challenge is glaring and often neglected. WHO JMP sanitation estimates indicate that more than 60% of the 2015 population in these countries rely on on-site sanitation facilities, with trends indicating a general positive trajectory in sanitation improvements across the board. This implies continued reliance on FSM in the region in the near future, with opportunities for innovation and expansion of FSM, including business models for improved latrine construction and emptying services. Results indicate a generally informal and unrestricted system of fecal sludge emptying and transportation comprising both the public and private sectors. Emptying charges of up to USD 300 per trip have been reported, which is prohibitive in a region with high poverty levels and low gross per capita national incomes. There have been efforts in countries like Malawi, Uganda, Senegal, and South Africa to improve and regularize this service by strengthening private sector participation through piloting the service level agreement (SLA) model.

Treatment and disposal is similarly either not well regulated or enforced and capacity limited, despite a legal framework in most countries that provides for the need for safe disposal and standards for wastewater discharge. Disposal and discharge of fecal sludge locally in open drains and directly in gardens/open fields is common practice, the latter mainly in the major cities.

The role for FSM past the containment stage is mainly undertaken by urban authorities, although often this role is either shared or delegated to water utility companies. The latter are mainly involved with transportation and treatment components of the FSM chain. Civil society has also been a major player in FSM with most initiatives undertaken in low-income/unplanned settlements.

Additionally there is limited and sometimes conflicting detailed data on the state of sanitation in many of these countries. In some cases, where data exist, it is difficult to access, making planning and development of solutions an onerous task. Challenges highlighted require that actors involved in the FSM chain are well prepared to undertake their roles.

1. CONTEXT

The lack of access to improved drinking water and sanitation is an acknowledged hindrance to economic and social development. Improving the ability of service providers to manage and deliver water and sanitation services effectively is critical to reducing the access gap.

In 2005, the African Water Association (AfWA) created a committee dedicated to sanitation and environment in Africa under its Scientific and Technical Council (STC), and in 2008, a task force on fecal sludge management (FSM) was formed within this Committee. The mandate of these groups is to advise African operators on addressing capacity building needs on sanitation and environmental issues in order to improve service delivery.

In addition, the Further Advancing the Blue Revolution Initiative (FABRI), funded by the U.S. Agency for International Development (USAID), has been partnering with AfWA and the African Ministers Council on Water (AMCOW) to improve the water and sanitation sector services in countries across the continent.

AfWA and FABRI's joint approach has been to "scale-up" by working simultaneously with large numbers of entities for maximum impact and increased representativeness. Building on its current work to reduce non-revenue water in 20 utilities in Africa, AFWA intends to use the same model to improve sanitation. It will work at both the national and local levels to expand the development, monitoring, and use of national plans and strategies while supporting private sector sanitation service provider engagement in implementation.

As part of the program design, a rapid assessment of stakeholder status in the sanitation sector in four sub-regions of Sub-Saharan Africa was undertaken from October to December 2015. Specifically, the assessment sought to:

- Briefly characterize the sanitation situation, particularly the status of non-sewer sanitation and fecal sludge management in select countries in Sub-Saharan Africa, highlighting both opportunities and constraints
- Identify and initially explore a number of non-sewer sanitation and FSM cases in Africa that are potential models for replication
- Shortlist municipalities, utilities, and operators from the sub-regions as potential mentors and mentees

This report presents a synthesis of the results from the different sub-regional assessments of the overall situation of African stakeholders in the sanitation sector. The data in the sub-regions report were gathered through a combination of desktop review and data verification using interviews with relevant stakeholders in the 31 study countries.

The outcome of this report will improve AfWA's and its partners' knowledge on the sanitation sector in Africa in general, and on the status of FSM and non-sewer sanitation in particular, including the available institutional, financial, operational, human resource capacity, and best practices for replication.

Furthermore, by identifying and exploring interesting and creative examples of non-sewer sanitation and FSM cases across Africa, this study will lay the groundwork for future potential peer-to-peer learning partnership programs under AfWA's Water Operator Partnerships Africa Program that will help increase and expand the impact of AfWA on water and sanitation in Africa.

2. OVERVIEW OF THE WATER AND SANITATION SECTOR IN SUB-SAHARAN AFRICA

This section sets the tone for this study by providing the context of water and sanitation in Sub-Saharan Africa. It presents an overview of the water, sanitation, and health (WASH) situation, key opportunities and constraints, and further summarizes the state of non-sewered sanitation therein. The discussion that follows considers the fecal sludge management chain as represented in Figure 1 below, adapted from Strande (2015) and the supporting environment. Fecal sludge generally refers to undigested or partially digested sludge, either slurry or solid, collected from on-site sanitation systems such as latrines, non-sewered public toilets, septic tanks, aqua privies, and cesspits containing blackwater (Tilley et al, 2008). The FSM chain represents an approach to safe containment, collection and transportation, treatment and storage, and disposal or reuse of fecal sludge that ensures health and environmental protection> It also closes the sanitation loop for increased sustainability and economic development.

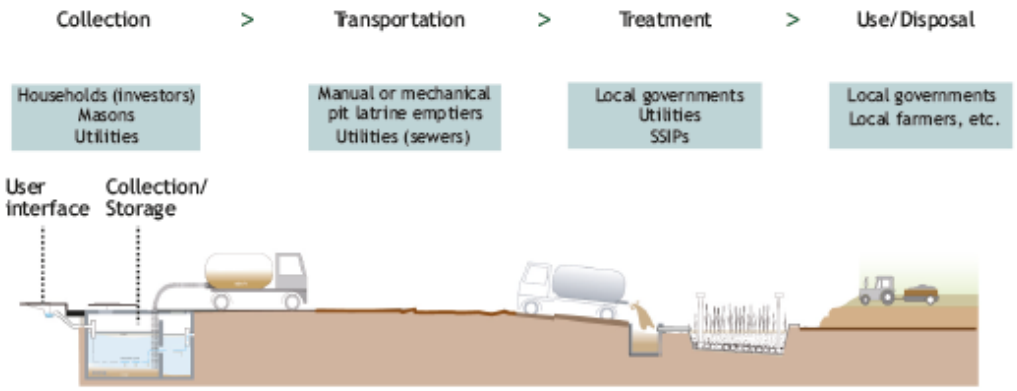


Figure 1: Fecal Sludge Management Chain

3.1 Overall Water and Sanitation Status in Sub-Saharan Africa

3.1.1 Statistics and general status

The contribution of improved water supplies and sanitation to human well-being and livelihood is widely acknowledged. Universal access to water and sanitation in Africa can contribute an estimated annual economic benefit of USD 22 billion, from reductions in health care costs and increased productivity from reduced illness. The World Health Organization (WHO) and others further state that inadequate sanitation is a major cause of preventable diseases.

According to 2015 JMP estimates[1], there are 695 million people in Sub-Saharan Africa without access to sanitation. The 2015 population in the study countries ranges from 0.2 million in Sao Tome and Principe to 183.5 million in Nigeria, with a total estimated urban population of 373 million. Poverty still remains synonymous with Africa. As part of progress reporting on MDG status, Africa remains

[1] JMP estimates have been used for consistency, although it is acknowledge that some countries like Uganda have different sector performance measurement criteria with conflicting statistics; this being an issue of contention globally

the region with the highest income inequalities, with poverty being multi-faceted and an impediment to key social services including water and sanitation (UNECA 2015a). The demographic profile indicates continued population growth in the region coupled with increased urbanization estimated at a rate of 4.5%. UN Statistics indicate that by 2035, urban populations will comprise up to 50%. This, combined with risks, vulnerabilities and challenges of poverty, implies social service delivery will continue to suffer.

A summary of the water and sanitation status is presented in Table 1 below. In Sub-Saharan Africa, where the study countries lie, more than 60% of the population relies on on-site sanitation facilities (WSP, 2014) and open defection (OD) is still present particularly in rural areas; Further analysis indicates a high percentage of urban population that use shared sanitation facilities. Sanitation has also gained prominence over the years with more financing allocated to the sector in all the countries. Proportionally there has been a positive trend in the WASH situation in the study countries as shown by the proportional increase in improved coverage, averaging 43 and 19 percent points for water and sanitation respectively since year 1990.

Table 1: Summary Study Country WASH and Demographic Statistics

		Water Coverage (%)		Sanitation Coverage (%)		
Parameter/ category	**Population (million)**	**Total improved**	**Piped on premises**	**Total improved**	**Shared**	**OD (%)**
Urban	307.4	86.5	33.3	41.6	33	7.3
Rural	495.2	55.7		24.5		28.8
Region	802.7	67.5	15.9	31	18.9	20.6

Source: wssinfo.org

A positive trajectory has been recorded with declining OD rates over the last decade. Literature and anecdotal evidence indicate that the shift along the sanitation ladder still involves reliance on non-sewered sanitation, further amplifying the case for attention to FSM services in the region and opportunities therein. In September 2015, the sustainable development goals were globally adopted. African countries have pledged to provide safe water and sanitation to all by 2030. This translates to increased investment in sanitation improvement and an increased focus on improving processes and systems to ensure that sanitation services are effectively delivered and utilized.

3.1.2 Institutional arrangements and legal framework

Common to all study countries is a decentralized governance structure for service delivery. In most of the countries, there are designated ministries responsible for water and sanitation with supporting regulations which provide the basic framework for water and sanitation service delivery. The institutional responsibility for sanitation is often multi-sectoral and shared among different ministries, including those responsible for water, health, environment, local government, and housing. Consequently, in practice, the roles are fragmented and not well articulated. However, cases like Senegal, Benin, Mali, Senegal, Ethiopia, Mauritania, and Burkina Faso have dedicated sanitation ministries. Regulations regarding proper sanitation exist in majority of the countries, albeit without specific provisions on FSM and are characterized by weak enforcement and adherence by stakeholders. There is an opportunity to clearly define procedural arrangements and stakeholder responsibilities, and thus strengthen FSM. Decentralized governance implies that

solutions can be localized and that services can be brought closer, provided the relevant actors have sufficient capacity.

3.2 Non-sewer and FSM status in the region

3.2.1 Collection and transportation

According to U.N. country statistics on sanitation, the majority of the surveyed countries have very low sewerage coverage, with Namibia recording a high at 63%. Other countries with appreciable coverage are Angola, Gabon and Zambia with 32%, 38% and 25%, respectively. This implies a heavy reliance on non-sewered sanitation. The statistics further indicate that fecal containment is predominantly through pit latrines on-site. Non-sewer status is typified by the pit latrines with coverage figures ranging from to 6.6% in Sao Tome and Principe to 91.6% in the Central African Republic; An opportunity for latrine construction and emptying services. Further analysis indicates that a majority (21) of the study countries recorded latrine coverage above 50%, 11 of which exceed 70%. Further analysis for the detailed statistics that constitute the above latrine coverage figures indicate that dry toilets comprise the largest proportion. Generally, non-sewered sanitation comprises (1) water closets and wet pits connected septic tanks or (2) dry latrines with either lined and unlined pits latrines. Groundwater contamination is a key risk from on-site sanitation systems, notably for countries like Botswana, where groundwater is the main source. Appropriate latrine technologies, standards, and policy enforcement are key areas for attention to address this challenge.

Figure 2: Sample pit latrines

Full pits are either abandoned or emptied, depending on the availability of space and funds for constructing new facilities, the cost of emptying services, and such like. Emptying these facilities is typically done every couple of years. The rate depends on the age and type of facility, as well as FS accumulation rates that are typically higher in unplanned settlements and institutions with higher latrine stance ratios. Emptying cesspits is done using both manual and mechanical methods. The latter is mainly through vacuum trucks of capacity between $6m^3$ to $10m^3$. FSM in the region is characterized by an informal system of fecal sludge emptying and transportation. This assessment found that the removal and haulage is largely unrestricted with limited or no formal obligations and service levels. However, in some cities in several of the countries like Benin, Burkina, Mali, Gabon, CAR, Senegal, Malawi, Kenya and Uganda, some associations of service providers have started formalizing the process through pilots on service level agreements.

Figure 3: Vacuum tankers

Cesspit emptiers exist in many of the major towns, although they are unregulated and often their services unaffordable. Charges/ tariffs are based on volume of sludge and/or number of trips with costs per trip up to USD 300 in Central African, USD 150 in West Africa (Gambia) and USD 50 in East Africa. The costs are very prohibitive for most urban dwellers and will continue to suffocate the FSM chain, especially in low income settlements. To address this challenge, some appropriate solutions for semi-mechanized pit emptying like the "gulper", "Evac" and mupet have been introduced. However, many of these solutions have not survived past the pilot phase due to several reasons mainly relating to institutionalization and O&M.

Figure 4: Semi-mechanized pit emptying

Manual pit emptying has not been regulated; neither are standards for occupational health and safety enforced for this service. The high demand for these services continues to support the status quo, largely because they continue to provide an affordable option especially for the low-income urban dwellers. Municipalities like eThekwini in Durban, South Africa have made some strides in improving this sector through development and promotion of appropriate hand tools, as shown below.

Figure 5: Manual cess pit emptying

3.2.2 Treatment and disposal

Literature reviewed s pointed out the challenges of de-sludging and treatment; majority of the fecal sludge is emptied in a haphazard manner and not safely disposed of. Results from this assessment attribute some of these challenges to limited institutional capacity including the absence of infrastructure and appropriate technologies for treatment of the fecal sludge.

Generally, deliberate fecal sludge treatment initiatives are minimal and are concentrated in larger cities. According to stakeholder consultations, in the towns with sewerage systems, fecal sludge treatment is considered as part of sewerage/WW management operations, many of which use biological treatment methods involving lagoons and activated sludge treatment units.

Generally, fecal sludge disposal is not well-regulated and indiscriminate and unsafe disposal in open drains, fields and gardens is common practice, the latter mainly in the major cities. Nyirenda and Holm (2015) reiterate this, noting that in Malawi, fecal sludge is [unsafely] disposed of directly in gardens or in open ditches acting as “transfer stations” from which private cess transporters collect for private gardens.

WWTP - Tanzania

discharge to water course

Transfer Pit - Kenya

Figure 6: Fecal sludge disposal methods

Furthermore, existing WWTPs are not functioning effectively since operations are not well controlled. In some instances, the WWTP will have the same tipping point for both activated fecal sludge from cesspits and WW from sewers, which compromises the efficiency of treatment functions like BOD removal, since optimal operating conditions cannot be guaranteed.

3.2.3 Supporting/ enabling environment

The role for FSM management in urban areas is not clear cut and at policy level is shared among several sectoral ministries. At an operational level, it is usually the responsibility of urban authorities, although often the role is either shared or delegated to water utility companies. The limited capacity and service levels by mandated institutions have provided space for non-state actors to bridge the gap. Typical participants include private sector mainly providing emptying services and civil society organizations supporting infrastructure development and development of FSM solutions, especially in low-income/unplanned settlements where sanitation improvements are a critical need. The regulatory framework in most countries exists, albeit with some gaps on roles related to management non-sewered sanitation.

The region has seen more attention to FSM over the last five years, particularly in low-income urban settlements. There are some targeted efforts to improve FSM in all the countries. For example, in most of the capital cities there are initiatives to improve the emptying and hauling stages of the fecal sludge chain. Technological interventions and business models that target the sustained engagement of the private sector in emptying and transportation services are being tested, e.g. research on treatment technologies, use of localized emptying solutions like the MAPET and VACUTUG, and engagement of private sector using service level agreements (SLAs), dedicated FSM projects targeting informal settlements in major cities. For the latter, civil society has been a key active player with NGOs, like Water for People, WSUP, and WaterAid, that champion several initiatives.

3.2.4 Key FSM challenges in the region

Sanitation and, in particular, fecal sludge management in urban areas still remain a challenge despite the considerable efforts made by the states and their respective partners over the years to commitments as prescribed in the MDGs, national strategy documents, and now the SDGs. Studies undertaken in the region on fecal sludge management, including WSP (2014) and Morella et al. (2008) continue to highlight several challenges related to FSM. Country-level assessments also reiterated these as outlined below:

- A history of focusing on sewerage over fecal sludge management, leading to poor development of solutions to improve fecal sludge management.
- Unplanned and irregular provision of fecal sludge management, largely managed in the informal sector by private businesses. Efforts to improve fecal sludge management are focused in informal settlements, excluding the large population in peri-urban areas that use septic tanks.
- Poor regulation and management of the fecal sludge management cycle, e.g. in most cities, containment is an unregulated household responsibility, often resulting in construction of simple pit latrines that cannot be emptied. Collection is poorly regulated, leading to illegal dumping; treatment and disposal facilities are largely lacking.
- Poor governance and the inadequacy or lack of specific laws to regulate the sub-sector, the latter limiting the effectiveness of financing to effect any improvements
- Rapid urbanization contributing to the proliferation of informal settlements characterized by unplanned infrastructure and dismal sanitation provisions, if any. The high-density of the informal settlements coupled with other challenges such as lack of tenure limit the solutions that would be technically and financially viable.
- Inadequate capacity in the sector in terms of infrastructure, human resource numbers and skills, financing, regulation and involvement of private sector as development partners. The limited availability of experts in the conduct of national programs and capacity building at national level.
- Project-driven FSM initiatives that are not institutionalized and seldom survive past the pilot or end of project phase. This limits sustainability of solutions and improvements are short-lived

The opportunities in the FSM value chain are several as earlier outlined. It is imperative for African governments and their development partners to optimize the benefits if any sustainable urban sanitation improvements are to be made.

3. ASSESSMENT OF SANITATION SECTOR STATUS IN THE EAST AFRICA SUB-REGION

The African Water Association (AfWA), through its Water Operator Partnership (WOP) Africa program, is engaged in promoting peer-to-peer partnerships to improve the performance of operators responsible for providing water and sanitation services to more than 60% of African urban households. The initiative's basic strategy is to seek accelerated improvements through more intense and systematic knowledge sharing, including peer support partnerships between operators.

A key priority action of the program is to use utility performance benchmarking to evaluate performance, rank them, and match the best performing utilities with ones that are underperforming. This effort can only be done through an assessment exercise.

4.1 Objectives

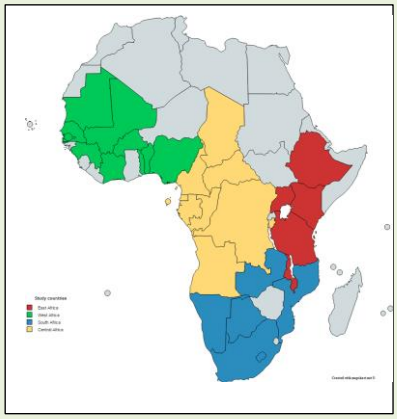
The specific objectives of this study are to:

- assess the sanitation stakeholder status in Ethiopia, Kenya, Malawi, Tanzania, and Uganda, and particularly the status of non-sewer sanitation and fecal sludge management
- identify and initially explore the most interesting cases of non-sewer sanitation and FSM in the East Africa sub-region that are potential models for replication
- identify potential mentees and mentors in East Africa sub-region for immediate and future peer-to-peer learning partnership program implementation

4.2 Methodology

The study employed mainly qualitative methods for data collection. Information and data was obtained from both primary and secondary sources. The latter from structured interview using the tool (questionnaire) attached as annex 1. Literature reviews from internet searches and documents obtained from the key informants largely informed the study. The study is limited to urban areas in the fi31 study countries listed in table 2 below sampling of towns was based on population[2], existence of FSM initiatives, sanitation performance based on utility performance benchmarking for the latest annual performance reporting as well inclusion of capital cities, considered the largest sludge generators. Specifically, the key informants targeted ministries responsible for sanitation as well as utilities, and municipalities in select large towns in each of these countries. The list of key informants targeted is presented in Annex 2 and results from the key informant interviews are presented in Section 5. Key informants were selected from key government institutions responsible for water supply and sanitation, water utilities, and local government authorities in major cities and municipalities.

Table 2: Study sample

Study countries Map	Central Africa	East Africa	Southern Africa	West Africa
	Angola	Ethiopia	Zambia	Benin
	Burundi	Kenya	Botswana	Burkina Faso
	Cameroon	Malawi	Lesotho	Cote d'Ivoire
	CAR	Tanzania	Mozambique	Gambia
	Congo	Uganda	South Africa	Guinea
	Chad		Namibia	Mali
	Gabon			Mauritania
	Equatorial Guinea			Nigeria
	Congo D. R.			Senegal
	Sao Tome and Principe			Togo

4.3 Results

4.3.1 The sanitation sector in specific countries

This section presents a review of the status of sanitation in 31 countries in Sub-Saharan Africa, with emphasis on the enabling environment that facilitates the fecal sludge chain (policy, planning and budgeting); the implementation of the fecal sludge management chain (including investment and operation of facilities); and sustainability of the services (maintenance, expansion of services).

A. Overall sanitation sector status

Overview

Urban sanitation is a cross-cutting sector that is rarely the responsibility of a single institution. This assessment noted that the majority of the study countries had similar characteristics and are in line with those for the regional grouping (Sub-Saharan Africa). Table 3 below gives summary sanitation statistics for each country and Table 4 a synthesis of the situation assessment of each of the study countries based on data contained in the regional reports, this obtained from country level stakeholder consultations and literature reviews. From Table 3, general characteristics for the study countries indicate a heavy reliance on on-site sanitation as indicated by the limited sewerage coverage and high latrine coverage. Generally, urban sanitation in most of the countries leaves a lot to be desired. Only Angola, Botswana, Equatorial Guinea, South Africa, and Senegal register access figures in excess of 65%.

Table 4 presents a broad picture of the institutional, management, and regulatory aspects, largely based on information from country respondents. There are efforts to improve FSM in a majority of the countries, but the policy and institutional gaps remain. Challenges of limited or an absence of specific regulatory provisions for FSM are common to all countries, particularly with regard to latrine

emptying, limited human resources and infrastructure capacity, informal nature and high costs of emptying service.

Table 3: Country level summary demographic and WASH statistics

Country	Population		Sanitation Access		Latrine coverage (%)		Sewerage coverage (%)	
	National	**Urban**	**Urban**	**National**				
	(million)	**%**	**%**	**%**	**Urban**	**National**	**Urban**	**National**
Angola	22.8	44.1	88.6	51.6	14.3	23.0	32.0	18.0
Benin	10.9	44.0	35.6	19.7	54.8	33.4	2.0	1.0
Botswana	2.1	57.4	78.5	63.4	56.0	54.6	2.0	1.0
Burkina Faso	17.9	29.9	50.4	19.7	79.6	34.1	2.0	0.0
Burundi	10.8	12.1	43.8	48.0	64.6	94.1	11.0	1.0
Cameroon	23.4	54.4	61.8	45.8	77.6	82.5	2.0	1.0
C A R	4.8	40.0	43.6	21.8	91.6	72.1	0.0	0.0
Chad	13.6	22.5	31.4	12.1	63.1	26.7	3.0	0.0
Congo	4.7	65.4	20.0	15.0	86.0	82.6	0.0	0.0
Côte d'Ivoire	21.3	54.2	32.8	22.5	47.5	42.9	15.0	7.0
D R C	71.2	42.5	28.5	28.7	80.3	81.5	1.0	0.0
Equatorial Guinea	0.8	39.9	79.9	74.5	33.5	23.5	12.0	9.0
Ethiopia	98.9	19.5	27.2	28.0	78.2	60.9	0.0	0.0
Gabon	1.8	87.2	43.4	41.9	59.1	63.6	38.0	33.0
Gambia	2.0	59.6	61.5	58.9	65.8	80.0	5.0	2.0
Guinea	12.3	37.2	34.1	20.1	74.6	66.3	0.0	0.0
Kenya	46.7	25.6	31.2	30.1	60.1	74.8	0.0	0.0
Lesotho	2.1	27.3	37.3	30.3	84.0	0.0	7.0	0.0
Malawi	17.3	16.3	47.3	41.0	84.7	92.4	2.0	0.0
Mali	16.3	39.9	37.5	24.7	87.3	84.3	0.0	0.0
Mauritania	4.1	59.9	57.5	40.0	43.6	32.4	4.0	2.0
Mozambique	27.1	32.2	42.4	20.5	77.1	57.7	0.0	0.0
Namibia	2.4	46.7	54.5	34.4	9.7	12.1	63.0	33.0
Nigeria	183.5	47.8	32.8	29.0	46.5	51.9	9.0	5.0
Sao Tome and Principe	0.2	65.1	40.8	34.7	6.6	6.2	6.0	6.0
Senegal	15.0	43.7	65.4	47.6	68.7	65.6	11.0	5.0
South Africa	53.5	64.8	69.6	66.4	12.3	32.7	0.0	0.0
Togo	7.2	40.0	24.7	11.6	38.5	29.1	0.0	0.0
Uganda	40.1	16.1	28.5	19.1	86.8	73.2	0.0	0.0
Tanzania	52.3	31.6	31.3	15.6	67.8	74.2	0.0	0.0
Zambia	15.5	40.9	55.6	43.9	61.5	68.3	25.0	10.0

Source: wssinfo.org

Table 4: Country level Sanitation and FSM status

	Country	General sanitation status	Non-sewer and FSM status
Central Africa	**Angola**	***Institutional set up*** The Ministry of Energy and Water, is the principal institution mandated for energy, water and sanitation service delivery. The State Secretariat for Energy and Water is responsible for sanitation nationwide, including management of programs in these sub-sectors. There are also technical and administrative directorates nationwide, and technical services responsible for sanitation management at the provincial (decentralized State services) and communal (technical municipal services) levels. The Political capital has a public utility called Empresa de Luanda Linpeza e Saneamento (ELISAL - EP). ELISAL EP is responsible for managing wastewater, fecal sludge and solid waste. The Ministry of Health, through its National Public Health Directorate (DNSP) is responsible for promotion of sanitation and education in agricultural zones; The Ministry of Agriculture and Rural Development (MINADER) also has mandate water and sanitation infrastructures in rural areas; Other supporting institutions include the Ministry of Environment, responsible for environmental management and the Ministry of Town Planning and Housing, responsible for land use, urban planning, housing and construction; Urban sanitation in Angola is regulated by the Environmental Code and Act 6/02 enacted in 2002, which defines the general principles for the management, planning and use of water resources Multiple actors in sanitation. Majorly Centralized Management through mandated ministries supported at operational level by decentralized local authorities (LAs) under a "Municipal Board" arrangement and private entities, some engaged under a “Service Contract” by the LAs. to private operators. Sanitation coverage: 13.4% national, 31.7% in urban areas against 0.7% in rural areas. Coverage rate of decent private sewage disposal is 90.1% with an estimated 132 million m3 of waste water collected annually. Sewerage is concentrated in particular areas or districts of large Angolan cities, including Luanda, Huambo, Lubango, Lobito and Benguela and comprising combined sewers discharging to wastewater treatment plants (03) treating an estimated 90 to 110 million m3 of waste water annually	Fecal sludge is mechanically drained into the sanitation systems by specialized trucks with capacities of 6m3 to 20m3. The number of trucks numbers and service providers for emptying/draining has not been estimated. Overall it is estimated that there are more than 100 fecal sludge drainers in Angolan cities constituting more than 30 SMEs and draining enterprises, some of which are professional organizations. Approximately 130,000 m3 of FS is collected in all Angolan cities annually with an average 12,000 trips each costing about US$ 100 Generally FS is indiscriminately disposed of at unofficial sites that are not well equipped, this arising out of the lack of proper dumping sites and FS treatment plants. Consequently, effluent quality does not meet the technical and environmental standards apart from in Lobito and Benguela cities that have WWTP very good wastewater and fecal sludge treatment capacities. Existing regulation has inadequate texts specific to FSM in urban areas; Most FSM initiatives are currently project driven with no national strategy for FSM, However, there are ongoing FSM initiatives including a study to improve urban sanitation and sustainable FSM in 3 cities (Luanda, Benguela and Lobito)

	Cameroon	Cameroon has no Ministry dedicated to sanitation. This sector is shared by several ministries including: Ministry of Water and Energy (MINEE), Ministry of Housing and Urban Development (MINHDU), Ministry of the Environment, Nature Conservation and Sustainable Development (MINEPDED), Ministry of Public Health (MINSANTE), and Ministry of Industry, Mines and Technological Development (MINIMIDT). There are sub-directorates in the ministries and technical services in the municipalities that are directly responsible for sanitation management at national and municipal levels respectively. At city level, sanitation management is the responsibility of Urban communities (City authorities). Sanitation management in Cameroon is the responsibility of municipalities and decentralized local authorities, supported by decentralized private operators (formal and informal). Sewer and water treatment plants management falls under "Service Contracts" signed by the Real Estate Company of Cameroon for residential areas especially in large cities such as Yaoundé and Douala. The management of the collection and transportation of fecal sludge is provided by private companies that do not have specific contracts with their customers. ***Regulatory framework*** Key urban sanitation sector regulations include: • Law No. 64-LF-23 (1964) on the protection of public health, which provides urban sanitation a prominent place in all development activities; • Law No. 96/12 dated August 5, 1996 on the framework law relating to environmental management • Law No. 2004/003 dated April 21, 2004 governing town planning • Law No. 2004/019 dated July 22, 2004 laying down the rules applicable to the regions in accordance with the decentralization framework law. • Water code prescribed as Law No. 98/005 with provisions for sanitation as contained in several decrees notably : Decree No. 68/59/COR (1968) that gives technical specifications on toilet construction , Decree No. 2001/216 (2001) establishing a special account to finance sustainable development projects for water and sanitation and Circular Note No. 067/NC/MSP/DMPHP/SHPA (1973) of the Minister of Public Health specifying the functions of Technicians and Sanitary Engineering Technical Agents assigned in the provinces; ***Sanitation statistics*** • Sewerage is found only in the city of Yaoundé and comprises about 12km estimated at about 1%. Waste water from these sewers is treated at 13 biological WWTP, 11 of which are of the "activated sludge" type. This system services five (05) districts and eight (08) public institutions including 3 hospitals. • A 56% coverage rate of city dwellers in improved latrines against 42% for non-improved sanitation and 1% OD rate in the cities;	Urban sanitation almost entirely non-sewered. Draining filled pits is quite common in Cameroonian cities, with over 85% of households doing it. This mainly through mechanical draining done by about 50 small SMEs; 15 in Yaounde, 30 in Douala and about 10 in the secondary cities. There were about 80 vacuum trucks in Cameroon in 2014 with capacity of 6 to 32m3 each, about 60% found in Doula and majority operating informally and not recognized by the municipalities. Draining septic tanks is more favored because of the arduousness of emptying traditional latrines that combine solid waste that can damage pipes and drainage pumps. There are only two (02) official simple fecal sludge dumping sites, one in Yaoundé in Nomayos (which accommodates 20% of the daily production) and another in Douala in Bois des Singes (which accommodates less than 15% of the daily production).The management of these dumping points is based on an informal agreement between draining companies and local residents and the land owners. These agreements state the terms for discharging and dumping the contents of the vacuum trucks. These terms include the payment of lump "taxes" to a site management committee set up by the people owning the sites. The demand for emptying services is very high with vacuum trucks operating with no downtime. Consequently highs rates of up to USD 400 are charged; average 82,000 CFAF[3]/draining (ranging from 50,000 CFAF to 250,000 CFAF/draining) in Yaoundé and 12,775/draining (ranging from 35,000 to 200,000 CFAF/draining) in Douala. There is no fecal sludge treatment plant in Cameroon. A project aimed at providing a prototype is under construction in the city of

[3] I USD = 600CFAF

		• An annual volume of wastewater collected is estimated at 7.6 Million m3, of which one third in Yaoundé (about 1.9 Million m3/year) and two-thirds in Douala; • An annual volume of wastewater treated: 7.6 million m3 • An average volume of fecal sludge collected: 200,000 m3/year, of which 38,012 m3 in Yaoundé and 108,551 m3 in Douala, the remainder in the secondary cities of Cameroon;	Douala, with funding from the Bill and Melinda Gates Foundation.
	Central African Republic	***Institutional set up*** The sanitation sector is not specifically anchored in a given national ministry. The sanitation responsibility rests under three ministries: The Ministry of Energy and Water, The Ministry of Public Health, The Ministry of the Environment. Management of sanitation is fragmented with centralized state management implemented at national level by the in charge of this core sector and decentralized functions at by the local government level structures of these technical ministries as well as Management by the municipalities or local governments by municipal technical services The management of the sewage systems is of the "Municipal Board" type while the management of wastewater treatment plants is of the "service contract" type). The corresponding model for the management of the collection and transportation, including the fecal sludge dumping points, is the "Municipal Board" type Stakeholders in the urban sanitation sector in CAR have the same the "public office" legal status type, whether they operate in the sewage systems, wastewater or sludge treatment plants. ***Regulatory Framework*** The laws regulating the urban sanitation sector in CAR, include : - The Hygiene Code, - The Environmental Code, - The National Sanitation Policy and Strategy Paper. ***Sanitation status*** - Collective sanitation coverage rate : Less than 2%; - Improved urban sanitation : 73.5% of city dwellers including 41.5% shared sanitation - 6.6% OD rate; - No data on Annual volumes of wastewater collected and treated - Average volume of fecal sludge collected: between 28,000 and 35,000 m3/year; - Average annual number of draining: 4,500 and 9,000 trips of 6m3 each;	Fecal sludge is exclusively dumped on two (02) official and undeveloped sites. Desludging and transportation is done using vacuum trucks; only 3 trucks are officially known, these operating in Bangui, the capital city, and belong exclusively to one (01) identified formal business and two (02) identified informal enterprises. There is also a local organization of drainers in CAR. Average price of the draining service: 35,000 to 150,000 CFAF depending on the volume of truck. Fecal sludge is regulated at the national level and the implementation of the regulation is the responsibility of national directorates, regional services and municipal technical draining services at the local level. Outside Bangui, there is no other reference city for sludge management. In this urban center, IRAD, a company, constitutes the only reference entity for fecal sludge management.

	Congo	***Institutional set up*** Several ministries share the sanitation responsibility and mandate namely: ✓ The Ministry of Energy and Water (MEH), which plays the role of Project manager for all sanitation projects and programs; ✓ The Ministry of Health and Social Affairs, which develops, implements and monitors the assessment of policies, strategies and sanitation action plans for the preservation of human health, in cooperation with the other ministries and institutions; ✓ The Ministry of Environment; ✓ The Ministry of Construction, Urban Planning and Housing; ✓ The Ministry of Planning and Land Planning. Urban sanitation is managed by municipalities and decentralized local governments across the country supported by non-governmental organizations (NGOs) and decentralized private operators (formal and informal). Assets like sewage systems and water treatment plants are state-owned, however, management is delegated under "Service Contracts" signed by private operators and NGOs, each assigned a well-defined area in large cities of the country ***Regulatory framework*** ✓ Law No. 003/91 dated April 23, 1991 on environmental protection refers to the "Polluter Pays" principles and provides for taxes and fees for classified institutions. ✓ Law No. 7-2003 dated February 6, 2003 on the organization and functioning of local authorities; ✓ Law No. 9 dated February 6, 2003 laying down the fundamental guidelines of decentralization; ✓ Law No. 10 dated February 6, 2003 on the transfer of powers to local authorities Decrees, including: • Decree No. 2003-20 dated February 6, 2003 on the functioning of local administrative units; • Decree No. 2009-415 dated November 20, 2009, setting the scope, content and procedures of the environmental and social impact assessment and notice; • Decree No. 2009-156 dated March 20, 2009 on the Procurement Code. The regulatory texts have no specific fecal sludge management in Congo. ***Sanitation statistics*** There is a collective sewage (sewer) system in some cities including Brazzaville and Pointe Noire. These	The dominant assets for the decent disposal of waste water and excreta are those of the private or individual sewage disposal type. Fecal sludge collection and transportation are the responsibility of private companies that provide their services directly to customers. Mechanical draining is mainly practiced in Pointe Noire and Brazzaville, while in secondary cities, communities drain the pits manually or construct new toilets when pits full. It is done by about 12 SMEs using vacuum trucks with a capacity of 6m3 to 18m3 each. Draining services cost 40,000 to 200,000 CFAF/draining depending on the cities and distance from the dumping site. In general, no city in Congo has official dumping sites or fecal sludge treatment plants. Dumping is at Fecal sludge points managed by draining companies, and local residents and owners of these points. There is no fecal sludge treatment plant in Congo. The main constraints regarding the sustainable management of fecal sludge are as follows: - Lack of supervision, by national and local administrative authorities, of private sector actors who are involved in an informal way in the provision of sustainable fecal sludge management services; - Lack of fecal sludge treatment plants: predominance of undeveloped dumping points, which proliferate in Congolese cities; - High cost of spare parts in case of breakdown and therefore of the service provided;

		systems (most of them dilapidated or very old) cover less than 3% of the Congolese population (including 2.5% of city dwellers). Data on characteristics of these sewer systems, including waste water treatment plants, volumes of waste water collected and treated are not available. Similarly no data on FS volumes - Urban sanitation coverage: 59.3% - OD rate: 1.3% urban (against 20.5% in rural areas);	
	Chad	***Institutional set up*** There is no ministry specifically dedicated to sanitation, This core sector is anchored in five (05) ministries including: The Ministry of Rural and Village Water; The Ministry of Public Health; The Ministry of Infrastructure and Civil Aviation; The Ministry of Planning, Land Planning and Housing; and The Ministry of Environment and Fisheries. The functions are decentralized to local government level. The sewage systems, wastewater treatment plants, collection and transportation of fecal sludge, including the dumping points of fecal sludge are managed in accordance with the "Municipal Board" type, which, in actual practice, is based on "Service contracts" signed with private operators responsible for the field work. In the neighborhoods, Sanitation Committees, where they have been revived, take over. There are no sewage systems in the cities of Chad, much less wastewater treatment plants ***Regulatory framework*** Overall, there is no clear policy or strategy on sanitation.. However, several laws and regulations may relate to the construction of sanitation networks, especially to urban sanitation, land rights and decentralization. These texts are, inter alia: - The Hygiene Code and the Environmental Code; - Law N^{o} 23 dated July 22, 1967 on the status of state property; - Law No. 25 dated July 22, 1967 on the limitation of land rights. This law defines the procedures for expropriation and the principle for the compensation fixed by amicable agreement; - Law N^{o} 002/PR/2000 dated February 16, 2000, on the status of Regional and Local Authorities; - Ordinance N^{o}025/PR/92 on the general status of cooperative-like groupings and cooperatives in the Republic of Chad; - Decree N^{o}399/PR/MISD/97 date September 10, 1997 on decentralization;	In all the cities of Chad, there are very few mechanical drainers in large big cities like N'Djamena. Manual drainers are thus the most numerous. Average price of the draining service is 25,000 CFAF to 50,000 CFAF per trip There are no official standard dumping sites developed for exhausters. Three (03) authorisized dumping sites exist, 2 in Ndjamena and 1 in Moundou and these are poorly managed. , Draining companies dump the sludge collected directly in multiple inappropriate sites including to water bodies. There is no fecal sludge management plant in Chad. The dedicated sites are generally wild dumping sites scattered around the cities. Manual draining is done in very precarious hygiene and safety conditions. The sludge in this case is discharged directly into ditches or dumped into a hole dug on the same plot for this purpose. Chad has a total of about 52 vacuum trucks, including 50 in N'Djamena, 01 in Moundou and 01 in Sarh. These three cities account for about 25 formal draining SMEs. There is no no national or local association of sludge drainers in Chad.

		- Decree N°249/PR/MEE/ 02 defining the terms for the provisional transfer of the State's powers regarding the delegation of the drinking water public service to Regional and Local Authorities; - Decree N° 09/914 PR/PM/MERH dated August 6, 2009 on the regulation of pollution and nuisance to the environment; - Order N°034/PM/MEE/99/02 on the establishment and organization of a National Water Management Committee; - Order N°028/MEE/DG/2002 on the definition of the specific convention model framework for the transfer of the power to delegate the drinking water public service to a Decentralized Territorial Authority; - Order N°029/MEE/DG/2002 on the definition of the specific contract model framework for the delegation of the drinking water public service to a users' association or private operator; ***Sanitation statistics*** - Sewer coverage rate : Less than 0.8% of the urban population; - Improved urban sanitation: 56.4% of city dwellers - OD rate 6.6%; - No data on Annual volume of wastewater collected and treated as well as FS collected	
	Gabon	***Institutional set up*** The Ministry of Energy and Water Resources through the Urban and Rural Sanitation Directorate supervises the provision of this service in the whole country. In addition to this ministry, there are also other ministerial entities that share services directly or indirectly related to sanitation in rural and urban areas. These are: ✓ The Ministry of Infrastructures, Public Works and Land Planning that bears the burden of rainwater sanitation in human settlements in Gabon; ✓ The Ministry of Health which, in addition to its sovereign activities of preventive and curative health, is responsible for the implementation of public health policies. Sewer systems, treatment plants and dumping points are managed using the state governance model. Nevertheless, the collection and transportation of fecal sludge, including fecal sludge dumping points is delegated to private sector through service contracts signed with private companies. However, most of the FS produced and collected are not treated; these effluents are discharged into the environment or open public landfills, without any effective treatment.	Nationally, there are only two (02) undeveloped sites and officially recognized for the dumping of fecal sludge in the cities of Gabon. These two sites are fed by nearly 23 vacuum trucks officially registered in the cities of the country. Mechanical draining, manual draining and changing the place of filled toilets are the intervention methods when the tanks are full in Gabon. The sludge drained manually or mechanically is discharged into the only two (02) official dumping sites in all urban centers in Gabon. Local SMEs mechanically drain the sludge with specialized vehicles whose capacities range from 6m3 to 18m3, of which a total of 23 was recorded with ten (10) formal draining businesses and four (04) informal enterprises, mainly based in

		Urban sanitation is managed by a relatively complex model which brings together, depending on the urban localities of Gabon. This includes: - The centralized state management by the Water General Directorate, - The decentralized state management by the decentralized services of the State, - The Municipal management or management by local authorities following the decentralization process of basic services underway in Gabon, - The management by decentralized involving private operators. ***Regulatory framework*** There are regulations governing the urban sanitation sector in Gabon. These regulations are laws and decree on the Urban Planning Code and the Environmental Code and the Sanitation Code. ***sanitation statistics***: - Sewerrage coverage: below 2.0% of the urban population; - Urban coverage : 65% of city dwellers including shared facilities; - Annual volume of wastewater collected: 680 000 m3/year; - Annual volume of wastewater treated: 680 000 m3/year; - Average volume of fecal sludge collected: 14,500 tons; - The average annual number of draining is 2,600 trip;	Libreville. No information was made available for the other urban centers. There is a local draining organization The average draining price varies on average from 60,000 CFAF to 100,000 CFAF/trip from the draining places to the dumping sites Fecal sludge management is regulated at the national and municipal levels, through municipal directorates and technical services directly involved in sanitation management at national level and the management of fecal sludge in the municipalities respectively. In Libreville (the capital), there is a reference company in fecal sludge management, called SANIVIT.
	Equatorial Guinea	***Institutional set up*** Sanitation management is the responsibility of several institutions but is the primary responsibility of / anchored under the Ministry for Water. The other ministries involved inlcude: ✓ The Minister of Health for issues related to public health policies and the supervision of sanitation and public health measures; ✓ The Ministry of Environment, responsible for developing and implementing environmental policies, including compliance with the standards and guidelines for the discharge of pollutants in any component of the environment; ✓ The Minister of Housing and Urban Development for compliance with sanitation requirements in all operations related to urban planning, housing and buildings in the cities of Equatorial Guinea.	Full tanks are mechanically emptied by dedicated trucks whose capacities range from 8m3 to 20m3. No national estimate has been made of their number, including the number of SMEs and draining companies. Average price of one draining: 50,000 to 200,000 CFAF per trip. Fecal sludge is dumped on non-official undeveloped sites. Creating serious environmental challenges. Regulatory arrangements for urban sanitation and fecal sludge management do exist and are implemented by the Ministries of Water, Public

		The urban sanitation sector in Equatorial Guinea is managed in accordance with the combination of the following models: (i) Centralized management by the State, (ii) decentralised management by local governments or municipalities with private sector involvement at operational level. The management of urban sanitation, collection and fecal sludge management assets is of the "Municipal Board" type with some services like pit desludging subcontracted to private firms. Operators in the collective (sewered) sanitation sector have a private legal status There are sewer systems exists in some parts of the major urban centers such as Bata, Malabo these discharging to treatment plants, predominantly of the activated sludge type. ***Sanitation statistics:*** - Collective sanitation coverage rate: 12.2% of city dwellers; - Improved private sewage disposal coverage rate: 91.2% of city dwellers, including 12,3% cases of collective use of improved assets against 3.4% outdoor defecation; - Annual volume of wastewater collected: between 80 and 85 Million m3; - Annual volume of water treated: between 9,5 and 10,5 Million m3; - Average volume of fecal sludge collected: between 570 and 1150 m3/year; - Annual average number of draining: from 95 to 200 draining units a year;	Health and Environment, respectively.
-	**D R C**	***Institutional set up*** The sanitation sector is not specifically anchored in a given national ministry. In fact, this basic service depends on: - The Ministry of Planning (MINPLAN) which supervises the CNAEA (National Committee for Water Supply and Sanitation). The latter is an inter-agency that supports and coordinates the water and sanitation service provision and activities in urban areas; it also develops water codes nationwide; - The Ministry of Public Health; - The Ministry of Environment, Nature and Forestry Preservation (MECNE) that is responsible for the management of resources. It supervises the National Sanitation Agency (ANP), operating only Kinshasa; - The Ministry of Energy (Water and Hydrology Directorate), which oversees and supervises the national water utility in urban areas, REGIDESO, coordinates general studies on water resources sanitation is managed in accordance with the following models:	FSM is largely informal with transportation, treatment and disposal services unregulated. Fecal sludge is mainly dumped in undeveloped sites by mechanical draining companies of variable sizes. Prices charged vary considerably. No information is available on the characteristics of the companies and of the equipment used for pit draining. However, it is noted that there is an association of drainers with no detail on its operations Outside Kinshasa, there is no other reference city for fecal sludge management. In this urban center, few businesses can be considered as references for fecal sludge management.

		- The centralized state management implemented at national level by the technical ministries in charge of this core sector; - The decentralized state management implemented at local government level by the decentralized services of the technical ministries; - The management by the municipalities or local government by municipal technical services. The "Municipal Board" provides oversight over sewer system management with delegated management to private operators under "Service Contracts" for wastewater treatment plants, the collection and transportation and dumping points of fecal sludge in the country's urban centers. The collective sanitation infrastructures are made up sewer systems whose dimensions are unknown. This network feeds wastewater treatment plants of the activated sludge type. **Regulatory framewor**k The laws regulating the sanitation include: - The Hygiene Code and the Environmental Code; - The National Sanitation Plan; - Law No. 11/009 dated July 9, 2011 on the fundamental principles relating to environmental protection (called Framework Law on the Environment). **sanitation statistics:** - Sewerage coverage: Less than 0.8% of the urban population; - Urban Sanitation coverage: 56.4% 56.8% cases of improved assets sharing - OD rate: 3.9% - No data on Annual volume of wastewater collected and treated - Average volume of fecal sludge collected: between 440,000 and 900,000 m3/year; - Average annual number of draining: 75,000 trips of 6m3 per year;	
	Sao Tome and Príncipe	***Institutional set up*** The provision of sanitation services is not clearly assigned to a given ministry. Several ministries share the sector in Sao Tome and Principe, namely : - The Ministry of Natural Resources, Energy and Environment (MRNEA), through the Directorate for Nature Preservation, Sanitation and Environment Quality is responsible for the implementation of measures aimed at promoting sanitation; - The Minister of Agriculture and Rural Development;	Mechanical draining is an uncommon practice in the cities of Sao Tome and Príncipe. Thus, manual draining is the most common. The production and treatment potential for drained sludge is not known. Neither are there official dumping sites developed in compliance with standard regulation: informal sites are predominant and there is no plant for the

		- The Minister of Health responsible for public hygiene, the microbiological quality control of water - The Ministry of Industry, Trade and Tourism, co-responsible for waste management according to Decree No. 36/1999; - The Ministry of Public Works, Infrastructure and Telecommunications (MOPIT) responsible for the construction and rehabilitation of residual water and drainage. The urban sanitation management model in Sao Tome and Principe combines the following: - The coordinated centralized State management in charge of this sector; - The decentralized State management in local governments through the decentralized services of the technical ministries; - The management by the municipalities or local governments through the municipal technical services; - The decentralized private management, which is the work of private companies operating in various urban centers. There are no appropriate wastewater treatment plants, collection and transportation of fecal sludge, including fecal sludge dumping points in any city of Sao Tome and Principe. Existing FS dumping sites are informal. ***Regulatory framework*** Several Policy and strategy papers related to water and sanitation service provision exist including: - The National policy for water and sanitation; - The National Participatory Strategy for 2030 which, establishes the development of basic sectors; - The National Strategy for Equality and Gender Equity (SNEEG) in Sao Tome and Príncipe; - The Priority Actions Program; - The National Health Development Plan (PNDS); - The National Plan for the Environment and Sustainable Development (PNADD); - The Master Plan for Water and Sanitation Systems (PDEA). The texts governing and regulating the water and sanitation include, - Framework Law 10/92 - (DR) N^{o} 19, 09/09/92 defining the organization and powers of the districts, especially for water and sanitation; - Act No. 10/99 - (DR) N^{o} 15, 31/12/1999 on the management and protection of the environment;	treatment of raw sludge and the recovery of treatment by-products. No credible information found on the number of official or informal sites, or the number of vacuum trucks and number of draining companies operating in the major urban centers in Sao Tome and Principe. Outside Sao Tome, there is no other reference city for sludge management.

		- Decree-Law 59/80 dated December 18, 1980 creating the Health Code and establishing the parameters and limits for the quality and quantity of water and hygiene and the duties of the Ministry of Health; - Decree 37/99 (DR) N° 12, 03/08/99 on the assessment of environmental impacts; - Decree-Law 09/00 - (DR) N° 9, 28/12/00 - Defining the objectives, tasks and organization of the Ministry of Natural Resources, Energy and Environment and its directorates, including the DRNE; - Decree-Law 14/2005 - (DR) N° 22, 24/08/2005 - Defining the objectives and powers of the General Regulation Authority (AGER), which also includes jurisdiction on water; ***sanitation statistics***: - Sewerage coverage: Less than 5.7% of the urban population; - Urban Sanitation coverage: 47.2% including 12.0% cases of improved assets sharing - OD rate: 52.0%(2009) - Annual volume of wastewater collected: **1,000,000 m3/year;** - Annual volume of wastewater treated: **1,000,000 m3/year;** - Average volume of fecal sludge collected: **not available;** - Average annual number of draining: **none;**	
	Burundi	The sanitation sector is not explicitly anchored in a dedicated ministry. This sector can be found in two ministries, namely: 1. The Ministry of Public Health and AIDS Control (MSPLS), 2. The Ministry of Water, Environment, Land-use and Urban Planning (MEEATU). There are laws regulating the urban sanitation sector in Burundi. These texts are enshrined in the Sanitation Code, Urban Planning Code, Environment Code and Public Health Code of Burundi. Decentralised institutional structure with the centralized management by the State through the above two ministries, the management by local authorities or municipalities. These supported by private operators who are involved in direct service provision. Management of sanitation infrastructure including wastewater collection and fecal sludge transport systems, including authorized dumping points or systems is the responsibility of public institutions with decentralised to municipal authority in the respective urban LAs There is a sewer collection system in Burundi, mainly in Bujumbura, its political capital. This system is about 126 km long and dumps the effluents collected in only two (2) treatment plants based on biological treatment ("activated sludge" and "lagoonage" types).	There is no dumping site (official or not) for fecal sludge in the cities in Burundi. The drained sludge is literally discharged into the natural ecosystems (lakes, rivers, open spaces) available on the outskirts of the cities. The country has five (05) vacuum trucks to drain the filled tanks, four (04) in Bujumbura and one (01) vacuum truck in Gitega; which suggests the prevalence of alternatives like manual draining in the country's cities. The trucks belong to three (03) formal enterprises identified in these two cities and each trip costs on average 50 to 100 USD . No formal cess drainers association exists In general, there is no national, regional or municipal regulation in Burundi governing the management of fecal sludge. However, there are

		- Coverage rate of private sewage disposal: in urban areas = 81.7% (of which 50.8% share the assets) and 1.1% cases of outdoor defecation - No data available on annual Volumes of wastewater collected and treated Data on the amount of fecal sludge collected annually is also unavailable,	technical and administrative directorates and services responsible for the management of sanitation at national, regional and municipal levels. Some initiatives including the Lake Victoria Water and sanitation project (LVWSAN II), have been initiated to improve FSM in Burundi cities. However, the current political turmoil in the country limits any meaningful social and economic development
	Ethiopia	***Institutional setup*** The lead Government agency responsible for Sanitation in Ethiopia is the Federal Ministry of Health (FMoH), with devolved responsibilities to the regional and local governments (in line with decentralisation policy, and the National Water Resources Management Policy and Strategy (NWRMPS). The Ministry of Environment (MoE) also has shared sanitation responsibilities. In addition, each local government office contains a 'Woreda WASH Team' responsible for all aspects of water and sanitation development in the district, including management and oversight of scheme construction, provision of maintenance support, financial management, and M&E. In the city of Addis Ababa, the Environmental Protection Bureau (EPB) is the responsible agency for implementing the federal environmental policy and supervising the disposal of solid, liquid and industrial waste. The Addis Ababa Water and Sewerage Authority (AAWASA) is responsible for water supply and sewerage in the city including household pit and septic tank emptying services. There are however also private companies involved in the collection and transportation of fecal sludge. Ababa is the only city in Ethiopia with a conventional sewerage system, estimated at 11% coverage (Hywas Engineering Consultants & Partners, 2011). The rest of the country depends on on-site sanitation systems which are a combination of septic tanks and latrines, with 15% of households having no sanitation facilities at all. Household access to latrines is still low: of the 63% population that use latrines, only 7.3% are improved latrines (WHO/UNICEF, 2015). Moreover 34.3% of the population still does not have access to any sanitation facility at all. ***Regulatory framework*** Key legislation pertinent to sanitation includes: • The Environmental Policy of Ethiopia (1997). • The Conservation Strategy of Ethiopia which provides a framework for incorporation of environmental considerations into development activities. • The Federal Water Resource Policy relevant to waste water and FS discharge.	Pit emptying services are the responsibility of the local Authority and water authorities. The latter own and operate several trucks offering desludging services at subsidized costs. For example Harar Water and Sewerage Services Authority owns 3no. vacuum emptying trucks and carries out about 60% of the desludging services. In some cities, private operators and non-profit organizations have emerged to meet the high demand from the on-site sanitation facilities e.g. In Addis Ababa, the emptying services are provided by the water authority, AAWSA, by 10 No. private operators and by 3No. non-profit organisations. However because AAWSA offers subsidized services, private emptiers are at a competitive disadvantage and their businesses have low returns and are not sustainable. Manual emptying of pit latrines is also practiced, largely due to: inaccessibility of the pit latrine; consolidated sludge which complicates the suction of the vacuum truck; and affordability considerations among many. Not all sludge that is produced is treated; According to Hywas Engineering Consultants & Partners (2011), the sludge that is not transported is believed to be disposed of untreated into the environment; left in the pit until it solidifies; or "pooled out" into storm water system. In some

			cases, transfer stations exist, these intended to reduce the transportation costs, and the risks associated with long-haul of sludge to FSTPs. For example, in Addis, it is reported that the transfer stations constructed reduced the travel distance by an average of 12km against an average travel distance in Africa of 30km (Chowdhry and Kone,2015). Sludge treatment in Ethiopia is not adequate. For example, AAWSA operates two FSTPs (lagoons with sludge drying beds) with a combined capacity to treat 980m^3/day, and which receives about 150% of its capacity (Op cit). There is no dumping fee charged to the AAWSA-owned vacuum trucks while the privately owned trucks are charged a fee. This further renders the operational ground unequal and creates motive for indiscriminate dumping FS into the environment. FS reuse is mainly practiced among the low income communities. For example, farmers reportedly request for the fecal sludge to be discharged on their plots of land at no charge.
	Kenya	**Institutional set up** The Central Government is responsible for regulation and asset management while service delivery is decentralized to 65 urban and 35 rural water service providers (WSPs) at local/county level.. The WSPs are linked to 8 regional Water Services Boards (WSBs) which are in charge of asset management through Service Provision Agreements (SPAs). The Water Act also created a national regulatory board (WASREB) that carries out performance benchmarking and is in charge of approving SPAs and tariff adjustments. The stakeholders responsible for sanitation include government departments i.e. the Ministry of Public Health and Sanitation (MoPHS) which is the lead agency and responsible for policies on sanitation; Ministry of Water; Ministry of Local Government; Municipal Councils, and the National Environment Management Authority (NEMA). The Ministry of Education co-operates with the MoPHS in the area of school sanitation by participating in Water and Sanitation Program Committees. The Division of Environmental Health is responsible for ensuring conformity of standards; the City and Municipal Councils are responsible for enforcement of environment protection laws; and Water Service	The non-sewered urban sanitation coverage in Kenya is 73%, of this, an estimated 65% use pit latrines. (WHO/UNICEF, 2015). This coverage varies across and within local administrative units (counties), what is apparent is that unplanned settlements and regions with difficult geological characteristics that do not support latrine construction have the lowest coverage figures Pit emptying services are carried out either manually or mechanically. Manual emptying is usually carried out using buckets, which is then transferred to collection containers like drums and then transported to transfer points or dumped indiscriminately into storm-drains, gardens or in holes. The local authorities charge a disposal fee

		Boards are responsible for developing water and sewer facilities. According to WASREB (2014), the sanitation sub-sector faces challenges related to lack of a clear mandate on on-site sanitation and therefore Water Services Providers rely on external data sources, such as the Department of Public Health. It is important to strengthen the WSPs' mandate on on-site sanitation, especially if the up scaling of access to improved sanitation in urban low income communities is to be realized. **Regulatory framework** The legal framework for the water and sanitation sector in Kenya is entrenched in the Water Act Nr. 8 (2002), that provides for decentralization of service delivery, with functions and responsibilities for service provision devolved to the lowest administrative level. To guide the implementation of the Water Act, a draft National Water Services Strategy for was formulated. This strategy aims to achieve the GoK agenda to increase access to safe and affordable water and basic sanitation by 2015, based on the identification of sustainable access to safe water and basic sanitation as a human right and an economic good. In addition, the Ministry of Water and Irrigation MWI and the MoPHS have developed a common Water Supply and Sanitation Concept with clearly defined sanitation targets and harmonized roles and responsibilities between the institutions responsible for sanitation. The main policy document for the effective delivery of FSM is the National Environmental Sanitation and Hygiene (ESH) Policy of 2007 which provides the policy framework for the sector. The ESH outlines the policies and strategies aimed at creating an enabling environment to improve hygiene behavior and environmental sanitation. The Public Health Act, Cap 242 aims at ensuring conformity to national norms and standards, and making regulatory interventions to improve compliance. The Local Government Act, Cap 265 provides oversight responsibility over LGAs for ensuring compliance with the provisions of the Public Health Act and protection of the environment from pollution	for dumping into fecal sludge extraction trucks. The emptiers generally do not own their tools, but hire these from known industry equipment suppliers. Chowdhry and Kone (2012) found that teams of workers were providing emptying services in the urban informal settlements using equipment leased from an umbrella group that rents out the equipment. Mechanical emptying services are provided by the private sector using vacuum trucks or hydro-evacuating trucks with the public sector playing a varied regulatory and oversight role, generally involving licensing with limited enforcement (Losai Management Limited, 2012). Pit emptying services are licensed on a unit basis by the national environmental agency and a specific levy charged for a particular truck unit as certification of its fitness for use as a sanitation truck and hence is not transferable. Trucks for FS desludging are classified broadly as a sanitation truck and are required to meet minimum design and fitting specifications/standards (Op cit) and local fabrication capacity has been reported to exist. However, it is noted that for most emptiers the business is not self-sustaining and alternative income streams have to be sought. There are no separate FSTPs; fecal sludge is treated at the wastewater treatment plants. The fecal sludge private operators discharge the sludge at designated collection points along the sewer lines. The designated tipping points are characteristically man-holes located at a point on the trunk sewer line and designated by the Utility operator as the disposal point. Fecal sludge reuse is practiced to some extent with cases of unsafe use as fertilizer and as a bio-fuel sources notably at Bio-centers in low-income urban settlements (multilevel structures

			comprising with public ablution facilities that operate on a pay for use basis designed to produce bio gas out of FS)
	Malawi	***Institutional setup*** The lead institution, responsible for sanitation in Malawi is the Directorate of Sanitation and Hygiene within the Ministry of Agriculture, Irrigation and Water Development (MAIWD). It is responsible for *inter alia* provision of policy direction and enforcement as well as coordination of sanitation and hygiene initiatives; including those related to FSM. The Directorate of Water Development is responsible for sanitation infrastructure development as part of implanted water and sanitation programs and projects; The Office of the President and Cabinet provides oversight and facilitation towards functionality of these directorates Provision of water supply and sanitation services is the role of the water boards, this including waste water treatment and promoting improved on-site sanitation services. This role is undertaken in collaboration with local councils which also have a role for sanitation promotion in the respective local governments;. There are five Water Boards; The Blantyre and Lilongwe Water Boards, serve the two cities and their peri-urban areas while the remaining three Water Boards *viz* Northern Region Water Board, Central Region Water Board and Southern Region Water Board, serve the rest of the country. Catchment Management Authorities under Water Resources Board are responsible for catchment planning and management including sanitation related planning and development and pollution control. The Local Authorities under the Ministry of Local Government and Rural Development are responsible for sanitation and solid waste collection and management. The role of the Local Government institutions (District, Town, Municipal and City Councils) is to inter alia. plan and co-ordinate the implementation of water and sanitation programs at local council level in collaboration with relevant water utilities; conduct sanitation audits at community and household level; implement sanitation, health and hygiene activities, training, education; provide and maintain improved sanitation facilities including urinals, toilets or latrines as well as hand washing facilities in all public places. According to the Water Policy, local governments are responsible for planning and coordinating water and sanitation programs within their boundaries. Other institutions that are stakeholders in the sanitation sub-sector include: the Ministry of Education; the Ministry of Natural Resources, Energy and Mining; the Ministry of Health. ***Regulatory framework*** Malawi has several guiding legislations that relate to sanitation/waste management these include	Transportation is largely handled by the private sector. Private sector participation in pit latrine emptying countrywide is limited to a few medium to high level businesses/operators, with some informal providers. There are only two recognized businesses and one parastatal offering FSM in Malawi: Mr. Clean Malawi in Mzuzu, WES Management in Blantyre and Malawi Housing Corporation respectively. Holm et al (2015) Mr. Clean Malawi is the primary FSM operator in northern Malawi. Emptying charges are based on FS volumes, often estimated by size of truck these costs as high as USD. E.g. In the low income areas in Lilongwe private services providers who charge USD 17 per 200 liter drum against an equivalent of USD 1.4 plus 0.3 per km charged by the Lilongwe City Council (LCC). Pit latrine emptying businesses are required to be registered under the general National Construction Industry Council of Malawi. There are however are no business licensing requirements and no mechanism of enforcement of construction and service standards. There is no limitation on area of operation for Private operators. There are however efforts to improve service delivery in latrine emptying through efforts to (i) strengthen regulation and benefits using sanitation service level agreements and (ii) facilitate the creation of small-scale FSM enterprises before the end of 2017. The waste is transported to regional municipal sludge ponds. FS treatment is the responsibility of the local authorities e.g. LCC owns and manages a

		Public Health Act (Chapter 34.01 of the Laws of Malawi), the Local Government Act (1998), the Occupation Safety and Health Act; the Environmental Management Act and the National Sanitation Policy. It was reported that there is no specific legislation for the management of fecal sludge, this being managed in the context of existing provisions as summarized below: • The National Sanitation Policy (2008) encourages the provision of septic tank and latrine emptying equipment in cities, municipalities and towns; regular maintenance of latrines and public sanitation facilities; and provision of septic tank and pit latrine emptying services and sludge disposal (by private sector). • The National Environmental Policy (2004) sets national policy for management and protection of the environment. The National Environmental Policy outlines the need for pollution control, the safe disposal of wastewater, solid waste and the protection of water bodies, with the general principle of 'polluter pays'. • The Environmental Management Act (1996) controls the handling, storage, transportation, disposal and monitoring of waste disposal sites. • Malawi Growth and Development Strategy (2012) supports the implementation of the national agenda for introduction of VIP latrines. • The Water Resources Act (2013) focuses on management of waste that is a potential pollutant of water resources. • Vision 2020, provides a long-term development perspective for improving sanitation and hygiene services in the country; • The Public Health Act, the Pharmacy, Medicines and Poisons Act as well as a number of guidelines covering the safe disposal of hazardous and non-hazardous waste at health facilities; • Public Private Partnership Act () that provides for and promotes private sector participation in service delivery; provides the framework for involvement of private emptiers to support improved FSM • The Local Government Act and Decentralization Policy, which promotes accountability and good governance at the local level in order to help government reduce poverty; and mobilizing the masses for socio-economic development. • The Occupational Safety, Health and Welfare Act of 1997 that among other things promotes provision of potable water, adequate improved sanitary facilities, drainage systems and sound management of wastes at public workplaces wherever appropriate. According to Lilongwe city council officials, there are plans to develop the Public Sanitation and Hygiene Promotion Act which is intended to address all gaps in current legislation regarding rural and urban	FSTP. The digested sludge is disposed of as manure to subsistence farmers. The challenge of FSM is now widely acknowledged in Malawi; a lot of action research is ongoing to improve service delivery in FSM. Notably are the SHARE-funded initiatives implemented in partnership with local research institutions, on aspects like options for FS transportation and promoting private sector participation (PSP) in sanitation service delivery.

		sanitation in Malawi. These legislations can be contextualized at the Local Authority level, there are provisions for setting by-law, codes, standards and guidelines to govern sanitation. For example Lilongwe City Council, has a city specific waste Management Policy, Solid Waste Management By-Law, Standards on the Management of Public Toilets and the Guidelines for Private Waste Operators. ***Sanitation statistics*** Urban sanitation coverage in Malawi is 47% with a low level of service; 92.4% of the population use latrines, of which over 50% are traditional latrines. Only 20% of the population use improved latrines i.e. VIPs or pit latrines with a slab.	
	Tanzania	***Institutional set up*** The lead ministry, responsible for the sanitation sub-sector in Tanzania is the Ministry of Health and Social Welfare (MOHSW). Other ministries that are involved are the Ministry of Water (MoW), the Ministry of Education and Vocational Training (MoEVT), and the Prime Minister's Office – Regional Administration and Local Governance (PMO-RALG). Rural water and sanitation services in the country are provided by the Local Government Authorities while urban water and sanitation services are provided by regional water supply service authorities. The sanitation agenda is exercised through a 20-year Water Sector Development Program (WSDP) that focuses on Water Resources Management; Rural Water Supply and Sanitation; Urban Water Supply and Sanitation and Institutional Strengthening and Capacity Building. The different stakeholders in the provision of water and sanitation services implement their mandates through the WSDP. For example the Ministry of Health is responsible for the protection of public health through provision of adequate sanitation and hygiene education, while the Local Government Authorities (LGAs) are the accounting authorities, responsible for provision of licenses for operation and maintenance of water, sanitation and storm water drainage. Regulation of the water sector is implemented by the Energy and Water Utilities Regulatory Authority (EWURA), an autonomous regulatory authority responsible for regulation of the electricity, petroleum, natural gas and water sectors in the country. The regulatory functions of EWURA include, licensing, tariff review, monitoring performance and standards, and consumer protection including small towns and low income, and disadvantaged consumers (EWURA, 2014). ***Regulatory framework*** Key policy instruments guiding sanitation provision include the EWURA Act (2001), the sector is governed by the Water Resources Management Act (2009), the National Water Policy of 2002, the Water Supply and Sanitation Act (2001), the Dar es Salaam Water and Sewerage Act (2001) and the Water Ulitites Regulatory Act (2001). The Water and Sanitation Act (2001) exercises the licensing and regulatory functions; establishment of standards; establishment of guidelines on tariffs; monitoring of	There have been efforts to improve the quality of latrine construction. A pilot study in Arusha constructed demonstration units of composting and urine diverting toilets and with gardens fertilized using the compost from the latrines was successful and up-scaled to construction of further toilets. Pit emptying is done mechanically (using vacuum trucks or sludge exhausters), and manually where accessibility is limited or when affordability is low. Sludge emptying services are provided by three key players namely the Water Supply and Sanitation Authorities, the City Councils and Private Operators. The FS is collected by vacuum trucks and transported to the treatment facility (where available). For example, in Mwanza City has two fecal sludge settling tanks and sludge drying beds that receive the FS that is collected by the vacuum trucks owned by the Mwanza Urban Water and Sanitation Authority. The FS that is collected by the city council and the private operators is transported and disposed at the solid waste dumping site operated by the Mwanza City Council. The facility consists of an unlined sludge lagoon. The private operators discharge the waste at a fee. The dried sludge is used as farm manure at no charge to the neighboring communities. **Challenges**

		performance. In addition, the National Environmental Health, Hygiene and Sanitation Strategy is the key guiding document at operational level ***Sanitation statistics*** National and urban sanitation coverage is 16% and 31%, respectively. An estimated 74.2% of the total population and 67.8% of the urban population use latrines. 13% are improved latrines	Emptying in dense settlements e.g. the introduction of the Manual Pit Emptying Technology (MAPET) in 1992 was not successful due to limitations in transportation volumes, maneuverability of the vehicle and travel times. FSM is expensive and service options are limited; Pit emptying is delayed as long as possible including through use of additives to reduce accumulation and unsafe disposal including direct discharge to drains or open ground, also referred to as 'flooding out'. Lack of regulation and enforcement of the sanitation subsector; illegal dumping and use of untreated FS; lack of financial and human resources for sanitation development and upgrading at the City Council; poor coordination and differing priorities among stakeholders.
	Uganda	The institutional framework for sanitation service delivery in Uganda is fragmented. National Water and Sewerage Corporation (NWSC) is responsible for providing and managing sewerage in the country. On-site sanitation is the responsibility of municipalities under the Ministry of Local Government. The Ministry of health (MoH) is responsible sanitation promotion and policy oversight particularly in rural The Ministry of water and Environment (MWE) is responsible for setting policies and standards, managing and regulating water resources. It is also charged with determining priorities for water development and management. The Directorate of Environmental Affairs (DEA) is mandated to manage environmental and wetland resources and to sustain the biophysical and socio-economic values of the wetlands in Uganda. DEA through the National Environmental Management Authority (NEMA) manages and enforces environmental legislation using national waste management, wastewater discharge and sewerage regulations. In practice however, NEMA focuses on management of solid and hazardous wastes. Supervision of FSM is left to the local municipalities, which have limited financial and resource capacity. Additionally, the Directorate of Water Development (DWD) is responsible for providing technical oversight for the planning, implementation and supervision of delivery of water and sanitation services to both urban and rural areas. A Memorandum of Understanding was signed in 2011 to delineate the role of the MWE, MoH, and Ministry of Education & Sports (MoES). The MWE is responsible for hygiene and sanitation in public places in urban towns, MoH responsible for rural sanitation and MoES for school sanitation. However, in practice this role is for example where MWE provides water supplies to schools and rural growth	Desludging and transportation of FS is undertaken by the NWSC, Local authorities and private sector with overlapping responsibility in areas of NWSC operation. The emptying methods include: manual emptying (where the large vacuum tankers are unable to access the pit latrines, and where there are affordability constraints), semi mechanised (for example the Sludge Gulper) and mechanised emptying. Emptying and transportation of FS is not well regulated. This is largely due to the insufficient capacity of local governments to adequately provide the service both in terms of human resource, equipment and treatment infrastructure. Current fecal sludge collection capacity by private cesspool trucks is insufficient because (i) the demand for emptying services goes beyond major towns where operators are located, (ii) there is slow entry of new players into the pit emptying business, (iii) of the high investment costs required

		centres that have dismal sanitation ***Regulatory framework*** The existing regulations that govern FSM include: The Public Health Act 1964 modified in 2000; The KCCA Act, 2010; The Local Government Act 1997 (Cap.243); The Local Governments (Sanitation of Building Sites) By-laws Examples in Kampala includes Urban Agriculture Ordinance, 2006, that has a provisions for regulating re-use of FS, it prohibits use untreated human waste as manure for agriculture purposes; The Public Private Partnership Bill, 2012; and The National Environment (Waste Management) Regulations S.I. No 52/1999 and the Water (Waste Discharge) Regulations, 1998. These laws/regulations support the licensing, regulation of emptying services, enforcement of standards, engagement of the private sector and empowering the local councils / municipalities to form specific by-laws to supplement the existing laws. The sanitation coverage (mostly pit latrines) in urban areas in Uganda is estimated at 84.1%. Access to improved sanitation in urban areas in Uganda is estimated at 28.5%, but this does not include 44% of the urban population which uses shared facilities. This situation is further illustrated by the case of Kampala, the capital city with a population of about 1.5 million people whose sanitation coverage is estimated at 90% for on-site sanitation, 9% for sewered and 1% for open defecation. It is estimated that overall 52% of FS is safely managed and 38% of the fecal sludge from on-site sanitation is safely managed. The rest of the FS (30%) is discharged into the environment untreated. Treatment facilities exist mainly in the major towns managed by NWSC. Kampala has 2 treatment facilities: at the Bugolobi sewage treatment plant with a plant capacity of 5000m^3/day and at the Lubigi (combined FS and WW) Treatment plant capable of handling 400m^3/day. However, the Lubigi plant is currently overstretched, receiving up to 600m^3/day. NWSC plans to set up 2 additional decentralised FS treatment plants with a total capacity of 600m^3/day.	and (iv) absence of proximal FS treatment facilities, which increases the cost of transportation. The private emptiers Association of Uganda (PEAU) had 55 trucks in Kampala in 2014; An indication of the high demand and hence business potential for emptying services. This PEAU is a subscription based private company comprising about 70 % of the active emptiers of Kampala. The association entered a partnership with NWSC on business development including provision of parking space for trucks at the WWTPs. The PEAU has a formal variable rate structure for its services which members have to adhere to. High compliance levels have been noted especially since the variable component of the tariff structure is very subjective. It is proposed to cluster the other small towns (over 160) to share desludging facilities and treatment plants because the current volumes of sludge generated by individual towns do not justify heavy infrastructure development and equipment costs and there is no immediate need.
	Zambia	The water sector in Zambia is primarily under the responsibility of two ministries: The Ministry of Energy and Water Development (through the Department of Water Resource Development (DWRD), Water Resources Regulatory Agency (WARMA) and National Water Supply and Sanitation Council (NWASCO) is responsible for the overall water resources management (planning, regulation and development). The Ministry of Local Government and Housing through the Local Authorities (LAs) and commercial utilities (CUs) is responsible for water supply and sanitation delivery services. To separate regulatory and executive (policy) functions within the water supply and sanitation sector, NWASCO was established as an independent regulator to implement policy. Commercial Utilities are the main providers of water and sanitation services in urban areas. Currently there are about 5.97million people living in the CUs' service areas of which 1% of the population is serviced by seven Private Schemes. Private Schemes are companies that offer water supply and sanitation services mainly to their employees as a fringe benefit.	Non-Sewer and Fecal sludge management is practiced in Lusaka in specific areas were the programme has been implemented with the help of cooperating partners. The current regulatory system does not include non-sewered system thereby living the function to the local authorities and the CUs. The FSM systems were established to serve communities with non-sewered facilities that had challenges in finding areas and methods of disposal of fecal sludge from their facilities.

		All assets for the water supply and sanitation are owned by the water utilities through the Act of parliament that transferred the assets to the commercial utilities. The main regulatory instrument is the Water Supply and Sanitation Act No. 28 of 1997.	
	Botswana	Botswana has under gone Water Sector Reforms, these initiated in 2008 and aims to improve service delivery in the sector. As part of these reforms. The (Water Utility Corporation) WUC becomes solely responsible for water supply, reticulation and wastewater treatment in all settlements. Currently there are about 2million people to be serviced by the WUC. Previously both the DWA and district councils provided water, while the Department of Waste Management and Pollution Control handled wastewater. The DWA's mandate changes to water resource planning, development and management. This includes the planning and development of large water infrastructures such as dams and transfer schemes. All assets for the water supply and sanitation are owned by the WUC	The majority of the population is on the sewerage network
	Lesotho	The affairs of water supply are under the jurisdiction of the Ministry of Water. The water supply and sanitation function in Lesotho is managed by WASCOP which is responsible for the collection, transportation and treatment sewage 10 towns and 5 designated urban centres. The department of Rural Water Supply is responsible for sanitation services in the rural areas which are exclusively on-site VIPs and pit latrines. The local government are yet to take over the community councils. WASCOP through its mandate does engage private companies and contractors to provide services for sewerage management such as VIP or septic tank emptying	FSM is practiced in Maseru with a well-planned and designed management contracts that are potentially improving performance of fecal sludge management for the benefit of the users of the services
	Mozambique	All the Local governments, 10 provinces, 43 municipalities, and 128 districts have some level of responsibility and authority for water supply and sanitation activities. District governments, through the 2003 Law of Local State Organs, own all public water supplies within their jurisdictions and are responsible for planning and development functions Provincial responsibilities in the sector have been decreasing in recent years, and it remains unclear how their roles will change under the proposal to create new Provincial Water and Sanitation Services. The recently-launched national program, PRONASAR, is expected to increase the level of involvement of both the districts and provinces in rural water supply and sanitation. Municipal governments have exercised a very limited role in both water supply and sanitation despite their legal responsibilities. Their revenue-raising limitations have made them dependent for funding upon central government programs and institutions where local governments currently have minimal influence All assets for the water supply and sanitation are owned government The water supply and sanitation function is operated through a delegated management , including a	On-site sanitation is the most common form of excreta disposal and considering the constraints of funding and planning it will remain the most appropriate level of service for the urban poor in the medium term. Most peri-urban residents depend on simple pit latrines. Only a few ventilated pit latrines were built at schools and public places. Usually pits are not lined nor covered properly. In some few areas with a high water table or with rocky ground, pits are raised above ground often using termite mounds. As low-cost residential areas are planned residential areas, most of the houses are connected to either the sewer line or to individual or communal septic

		15-year lease contract with a private company for water supply and sanitation in the capital city, Maputo as well as Management Contracts for water supply in four provincial capitals – Beira, Quelimane, Nampula and Pemba – in the central and northern parts of the country. Available data indicate that only 38% of Mozambique living in the urban rural areas has access to sanitation	tanks. In some areas the houses are equipped with flushing toilets but in most low-cost areas, residents have access to ablution blocks with 2-4 compartments serving 2-4 households. Because of erratic water supply, people often flush their toilets using a bucket. However, due to lack of maintenance over several decades, much of this infrastructure is no longer operational and pit latrines are now a common feature in these residential areas
	South Africa	**Institutional set up** The Department of Water Affairs (DWA) leads and regulates the water sector in South Africa, develops policy and strategy, and provides support to the sector. DWA operates at national, provincial and local levels across all elements of the water cycle (i.e. from water resource management, water abstraction, water processing and distribution of potable water, wastewater collection, to treatment and discharge). DWA does not execute all of these functions; some are either constitutionally assigned to appropriate sector partners. Providing Water Services provision (water supply and sanitation) is the constitutional responsibility of local government (Metro, Local or District Municipalities) who act as the Water Services Authorities (WSAs) and often also Water Service Providers (WSPs) for all communities in their areas of jurisdiction. Some WSAs, where wastewater management is a regional challenge, have contracted out this function to bulk water services providers, however, the responsibility still rests with them to ensure an effective service. All assets for the water supply and sanitation are owned government through the water boards for bulk water and municipalities own assets within their areas. ***Sanitation statistics*** 11% of the national total population does not have access to sanitation. At least 26% (3.8 million) of households within formal areas have sanitation services which do not meet the required standards due to the deterioration of infrastructure caused by lack of technical capacity to ensure effective operation, timeous maintenance, refurbishment and/or upgrading, pit emptying services and/or insufficient water resources.	Fecal sludge management is operated Windhoek for a few systems producing sludge
	Namibia	A number of institutions are responsible for different aspects of water supply, management, and use, including government departments, parastatal institutions (such as municipalities and community-based Water Point Committees), private organizations, and individuals. • The Department of Water Affairs (DWA) within the Ministry of Agriculture, Water and Rural Development, which is responsible for all water resource development projects, including irrigation planning and development;	

		• The National Development Corporation (NDC) that executes new government developments and also manages schemes. All assets for the water supply and sanitation are owned government through Namwater for bulk water and municipalities own assets within their areas.	
	Benin	***Institutional and arrangement*** • Ministry of Urban Development, Housing and Sanitation • Sanitation General Directorate (since November 2014) In Parakou, the sewer system and WWTP are managed by Municipalities. In Cotonou, the residents' associations are responsible for the management of the sewer system (with extra intervention by the municipality), while the lagoon WWTP is managed by an NGO under a project of the University with the collaboration of the municipality. Fecal sludge treatement and wastewater management (sewage treatment plant and network) is delegated to SONEB, a state company ***Regulatory Arrangement*** • Hygiene Code • Urban Planning Code (being validated) • Blueprint law on the environment and particular texts on WW discharge, EAIs, waste collection , evacuation and treatment **Sanitation statistics** • Infrastructure consists of 5Km of Sewer network, (2.7 km in Cotonou and 1.3 km in Parakou), 5 WWTP (3 private activated sludge in Cotonou , 1 lagoon in Calavi, 1 lagoon in Parakou) • Coverage rate of collective sanitation : <1% • Onsite sanitation coverage rate - 40% • Volume of waste water collected - 50 000 m3 / year • Volume of wastewater treated - 20 000 m3 / year • Quantity of fecal sludge collected - 170 000 m3 / year • Average number of trips - 22 000 trips/year.	**Non Sewer and Fecal Sludge Management** • The fecal sludge management is currently entrusted to the private sector, without any control. 60 emptying companies are known, 50 of which are formal. • An association of emptiers exists and the average price of an emptying trip is 35 000 to 44 500 CFA, • FS is disposed of at 3 FSTP, in Parakou and Porto-Novo, 3 unformal/irreguler dumping sites in Parakou and on agricultural lands (on request) • There is no fecal sludge management policy but Institutional organization is underway, through the young General Directorate of Sanitation (implementation in november 2014). Eventually, dumping sites will be managed by SONEB (state enterprise), directly or via concession contracts. Furthermore the General Directorate of Sanitation and SONEB ensure better together organizer of the Association of emptiers that will always be in charge of Collection and transportation of fecal sludge.No control of fecal sludge Collection , transport and desposal ensures by private operators. • Ongoig initiatives in Cotonou and Abomey – East, Seme, Cotonou Podji West and Parakou

	Burkina Faso	**Institutional Arrangement** • Ministry of Agriculture, Water Resources, Sanitation and Food Security • National Office for Water and Sanitation (ONEA) • Department of the Environment and Sustainable Development in the Municipality of Ouagadougou • Centralized state management of FS and WW (ONEA) **Regulatory Arrangement** • Hygiene Code • Environmental Code • There is no legal text on fecal sludge **Sanitation statistics** • Infrastructure mainly in Ouagadougou and comprises of : A sewer network in industrial area of Kossodo, 1 WWTP, 1 FSTP & 7 Informal Feacal Sludge Treatment Plants • Coverage rate of collective sanitation - <1% • Onsite sanitation coverage rate – 9.6% • Volume of waste water collected – 841,325 m3/year • Volume of waste water treated - 841,325 m3/year • Quantity of fecal sludge collected – 613,987 m3/year • Average number of trips – 1,095 trips/year.	• private operators organized in Association of emptiers (which grouped mechanical and manual emptiers). The Mechanical Emptying Association exists and is officially recognised since 2005. There are 48 Vacuum Trucks and 24 listed emptying companies providing this service • The average price of emptying trip 8,000 – 20,000 FCFA • Some initiatives to improve FSM include construction of a FSTP in Ouagadougou. This project includes energy valorisation by anaerobic digestion.
	Cote d'Ivoire	**Institutional Arrangement** • Ministry of Construction, Housing, Sanitation and Urban Development • National Office Sanitation and Drainage(ONAD) • The private sector is contracted to manage the sewer system and treatment plant on behalf of the national utility **Regulatory Arrangement** • Environmental Code • Regulation of Sanitation Services • Decree establishing the approval of feacal sludge collection, transportation and dumping • Legal texts on fecal sludge management exist **Sanitation statistics** Infrastructure mainly in Abidjan, Yamoussoukro, Bouake, San Pedro and Dimbokro and Comprised of : • 1,050 km of sewer network	• The feacal sludge sector is managed by the private sector. • Collection and transportation of sludge is done by private operators. Mechanical emptying is through 104 Vacuum Trucks approximately 80% of which are in the capital Abidjan. The average price of emptying trip 15,000 FCFA • 104 listed companies of which 17 are informal • FSTPs are directly managed by ONAD, a national utility • The fecal sludge management policy initiated remarkable momentum carried by an important institutional and regulatory support • Ongoing initiatives in Abidjan, Yamoussoukro, Bouake, Korhogo, and San Pedro to improve FSM involving stakeholder

		• 5 Waste Water Treatment Plants (4 activated sludge, 1 filter drainage bed) • 4 Feacal Sludge Treatment Plants • 32 Informal Feacal Sludge Dumping Sites • Coverage rate of collective sanitation - 20% • No information on coverage of onsite sanitation • Volume of waste water collected – 60, 000,000 m3/year • Volume of waste water treated - 30,000,000 m3/year • Quantity of fecal sludge collected – 380,000 m3/year • Average number of trips – 40,000 trips/year.	identification and capacity enhancement as well as construction of FSTPs
	Gambia	**Institutional Arrangement** • No Ministry dedicated to sanitation. The sanitation component is fragmented. The Ministry of Health and Social Welfare is implementing the software of sanitation while the Department of Community Development implements the hardware component comprised of VIP latrine and slab construction. The National Environment Agency controls and implements the liquid waste and solid waste management components. Waste Water Management is through a Centralised state managed system for most infrastructure and services **Regulatory Arrangement** • Environmental Code • No legal text on feacal sludge management **Sanitation Statistics** • infrastructure comprised of 1km of sewer network in Greater Banjul, 1 WWTP, 10 FSTPs, 20 Informal Feacal Sludge Dumping Sites • Coverage rate of collective sanitation - <1% • Collective sanitation coverage – 59% • Volume of waste water collected – 55% • Volume of waste water treated – 20% • No information on quantity of fecal sludge collected • Average number of trips – 1,500	• Collection and transportation is by private enterprise using at least 20 Vacuum Trucks at an average price per emptying trip of 75,000 FCFA • No organization of emptiers exists

	Guinea	**Institutional Arrangement** • No Ministry dedicated to sanitation. The sanitation component is split between the three Ministries. The National Directorate of Sanitation and Living Environment under the Ministry of Environment, Water and Forests develops and oversees the implementation of government policy in the sanitation sector. The Ministries of Health, Public Health, and Town Planning and Housing are also involved in the sub-sector **Waste Water Management** • Collective sanitation management • Sewer networks and treatment plants managed by private enterprises through service contract **Regulatory Arrangement** • Code of Hygiene • Environmental Code • Town Planning Code **Sanitation Indicators** • Infrastructure comprises of: 75km of sewer network in Conakry, Kamsar, Sangaredi, Fria and Beyla, 3 WWTP, 2 FSTP and undetermined number of Informal Feacal Sludge Dumping sites • Coverage rate of collective sanitation - 67% • Collective sanitation coverage – 59% • No Information on volume of waste water collected • No information on volume of waste water treated • No information on quantity of fecal sludge collected • No information on average number of emptying trips	**Non Sewer and Fecal Sludge Management** • Collection and transportation is by private enterprise and there is an association of emptiers in Conakry. There are 30 registered vacuum trucks. 80% of them in Conakry and 5 listed formal emptying companies • Average price of emptying trip - 48,000 FCFA • Dumping sites are managed by private enterprise through service contract • The towns of Conakry, Kamsar, Sangaredi, Wed, Beyla have ongoing FSTP construction projects and Poubelle de Conakry Plans to build transfer stations for feacal sludge
	Mali	**Institutional Arrangement** • Ministry of Environment and Sanitation • National Directorate of Sanitation, Pollution and Nuisance Control **Regulatory Arrangement** • National Policy of Environment Protection • National Sanitation Policy • No legal text on feacal sludge management **Feacal Sludge Management** • Collection and transportation is by private companies • FSTP managed by private companies	• Towns of Djenne, Kita, Segou and Sikasso, Bamako 1 and 2 have projects in the 'sludge' sector and construction of developed dumpin sites • No companies which have begun or planned a feacal sludge management project • Best positioned cities to receive a feacal sludge management system • Bamako, Segou and Mopti are highly urbanised and onsite sanitation dominates. Demand for emptying is strong and the active private operators are organized through an association.

		Waste Water Management
		• Centralised state management of sewer and waste water treatment plant
		Sanitation Indicators
		• Infrastructure **C**omprises of: 67km of sewer network in Bamako, Mopti and Timbuktu, 6 WWTP – 3 active sludge and 3 lagoons, 1 FSTP, 20 Informal Feacal Sludge Dumping Sites
		• Limited information on sanitation indicators
		• Collective sanitation coverage - <1%
		• Average price of emptying trip - 35,000 – 50,000 FCFA
		No information on individual sanitation coverage, volume of waste water collected, volume of waste water treated, septage, and average number of emptying trips
			• Main constraints to FSM in Mali include the:
			  • Informal nature of most mechanical emptying operators
			  • Old vacuum truck park
			  • Low coverage of treatment facilities and recovery of by products
			  • High cost of collection and transport that supports manual collectors
			  • Lack of financing assets for private operators in the sectors

	Mauritania	**Institutional Arrangement** • Ministry of Water and Sanitation • National Directorate of Sanitation • National Office of Sanitation • The Sewage network and treatment plant in Nouakchott are managed in-house by the national utility **Regulatory Arrangement** • None **Sanitation Indicators** • Infrastructure mainly in Nouakchott and comprises of: 38 km of sewer network, 1 WWTP, 4 informal feacal sludge Dumping Sites, • 2% coverage for collective sanitation • 40% coverage for individual sanitation • 21,600m3 of waste water collected per annum • 10,800 m3 waste water treated per annum • 400,000 m3 of feacal sludge collected per annum in 40,000 trips	• Emptying services are mainly provided by private sector. There are 82 registered vacuum trucks of which over 90% are in Nouakchott. 03 listed informal emptying companiesproviding this service. • Average price of emptying trip - 30,000 FCFA • No organizations of emptiers • Indiscirminate dumping is done without any controls •
	Nigeria	**Institutional Arrangement** • No Ministry dedicated to Sanitation • The Water Resources Department oversees the sanitation sector • The sewage system is managed by the government and Feacal sludge dumping sites managed by government and private operators	• Emptying services are provided by private sector and the average price of an emptying trip is 24,000 FCFA • There is a local organisation of emptiers in Lagos and Abuja. • No information on cities or companies that have began or planned a FSM project

		Regulatory Arrangement • National Policy framework for Water Supply and Sanitation • No legal text on FSM	
	Senegal	**Institutional Arrangement** • Ministry of Water and Sanitation • Directorate of Sanitation • National Office of Sanitation of Senegal (ONAS) • Management of the sewer system is the responsibility of ONAS, the national utility. However, sewer systems maintenance (pipelines and pumping stations) is delegated to private operators in dakar and Saly **Regulatory Arrangement** • Sanitation Code • Environmental Code • Standard related to waste water discharge • Hygiene Code • Urban Planning • Decree for certifying private emptying companies in progress **Sanitation Indicators** • Infrastructure comprises:1641 km of sewer network in Dakar, Rufisque, Thies, Saly, a Mbour, Richard-Tol, Louga, saint-Louis, Kaolack, and Diourbel, 11 WWTPs (4 activated sludge and 7 lagoon type), 7 FSTPs • 27% coverage for collective sanitation • 67% coverage for individual sanitation • 15,350,000m3 of waste water collected per annum • 12,349,098 m3 waste water treated per annum • 450,000 m3 of feacal sludge collected per annum in 50,000 trips	• The private sector collects and transports feacal sludge. There are 205 registered vacuum trucks (135 Dakar, 45 Touba, 25 Mbour) for mechanical emptying and the average price of an emptying trip is 23,000 FCFA • 5 formal and 30 informal emptying companies • There is a National organizations of emptiers • FSTP management in Dakar is controlled by the national utility . ONAS is responsible for all feacal sludge dumping sites. However, a process was initiated in 2013 to delegate the FSTPs to private operators. Currently 3 FSTPs in Dakar are managed by a private company (Delvic Sanitation Initiatives) • Ongoing FSM improvement initiatives in Dakar, Pikine and Rufisque under a project to regulate and improve emptying service provision (including through provision of incentives), increase FSTP capacity and promote Value addition in the feacal sludge value chain through the omni-processor, an innovative machine intended to produce value from the feacal sludge.
	Togo	**Institutional Arrangement** • No ministry dedicated to sanitation. Several departments in different ministries are concerned in sanitation. The ministries include: Ministry of Agriculture, Animal Husbandry and Water Resources, Ministry of Health and Social Protection, Ministry of Urban Development, Housing and Living Conditions, and Ministry of Environment and Forest Resources • Centralized state management for the sewer network	• Collection and transport are carried out by private companies and there services are not regulated. Average price of emptying trip - 25,000 FCFA • Authorized dumping sites are managed by government • To date sanitation programs are still focused

		Regulatory Arrangement • Town Planning Code • Environmental Code • Water Code (which includes sanitation) • Public Health Code (which includes hygiene) • Framework Law on Environment • The National Hygiene and Sanitation Policy is being drafted • There is no legal text on feacal sludge **Sanitation Indicators** • Infrastructure reported includes 6 Informal Feacal Sludge Dumping Sites • 2% coverage for collective sanitation • 35% coverage for individual sanitation • No information on waste water collected, waste water treated, feacal sludge collected, or number of emptying trips	on access to private toilet (CLTS). The emptying service exists in only in big cities, but not infrastructure for fecal sludge treatment and recovery byproducts. • With the project "Toilets for all in Sokode", Togo will have its first FSTP. There will also be an institutional and regulatory organization of fecal sludge industry.

B. Sanitation sector stakeholders' status - SWOT analysis of key stakeholders

This section presents a SWOT analysis of capacity of select study countries for the Central, South and West Africa regions, as well as key institutions (water utilities and city councils) for the East Africa region with regard to FSM service delivery.

KENYA – Water Utilities

STRENGTHS	OPPORTUNITIES
• Established companies with large client base and mandate for sanitation in urban areas • Institutional Capacity: Experience in all stages of the FSM chain, majorly involved with transportation and treatment of FS and licensing emptiers with staff dedicated for these functions • Consumer confidence • Financial Capacity: Collections from water sales, and currently have budgets for FSM activities. • Operational Capacity: Generating funds from rental/lease of own exhausters	• Large volumes of fecal sludge generated, only 16% sewerage coverage • Increasing financing for FSM eg under LVBC, AFD • Facilitating policy environment that provides for decentralised service delivery • improved functionality/ utilisation of existing treatment units • Increased interest and involvement of non-state actors in FSM e.g. Exhausters and NGOs in reuse of sludge for energy
WEAKNESSES	THREATS
• Largely a sewerage focus • role for FSM not well delineated • limited interventions/ service delivery to urban poor settlements; a key segment for high FS volume generation	• financial potential of FSM potential of benefits from sludge • regulation of sanitation

MALAWI – City councils

STRENGTHS	OPPORTUNITIES
• Established government entities with departments responsible for sanitation • Legal framework particularly the sanitation policy 2008 that facilitates FSM activities e.g. *City Waste Management Policy*, *Solid Waste Management By-Law*, *Standards on the Management of Public Toilets* and the *Guidelines for Private Waste Operators* • Existing capacity and experience dealing with FSM activities with several projects and initiatives in all components of the FSM chain. • Has a city development strategy that with key commitments on sanitation improvement • Financial capacity – Budgeting for FSM activities	• Increased interest and involvement of non-state actors in FSM eg. Exhausters and NGOs in reuse of sludge for energy • High on-site sanitation coverage which translates to the need for proper FSM services • High demand for FS by-products • Available external funding for FSM activities as evidenced from the several projects currently under implementation
WEAKNESSES	THREATS
• limited capacity to undertake regulation and monitoring role • Human recourse capacity – more staff required to operate WWTPs	• Transfer of FSM mandate to water utilities • Unplanned settlements and weak regulation of land management making planning for infrastructure difficult
ONGOING SANITATION INITIATIVES	
Blantyre City Council • The Mayor's campaign championing a clean and green city • Sanitation Service Level Agreements project co-financed by the Gates foundation and DFID that promotes private sector participation in FSM. Key project components are :Provision of on-site fecal storage facilities, regularising Public Private Partnerships in Fecal Sludge Management, Promoting appropriate technology for pit emptying in Low Income settlements, Providing appropriate fecal sludge treatment and final disposal • Rehabilitation of the Waste Water Treatment Plant • Lilongwe City Council • Lilongwe-Ukhondo Promotion Project/Big Dig- The project was aimed at improving water and sanitation situation in peri-urban areas of Lilongwe City. It involved aspects on planning, implementation and, monitoring of sustainable sanitation and hygiene and water interventions.	

• Lilongwe City Council and Water Aid Malawi are implementing a project on Integrated Water and Sanitation in the Low Income Areas of Lilongwe City (I-WILL). • The Beautify Malawi (BEAM) Trust is also championing sanitation and health issues in Malawi

UGANDA – NWSC and KCCA

STRENGTHS	OPPORTUNITIES
• Institutional capacity - Established semi-autonomous government institutions with legal mandate for FSM. Kampala Capital City Authority (KCCA) and National Water and Sewerage Company (NWSC) • Large client base and mandate for FSM (mainly treatment and transportation) in urban areas under jurisdiction • Existing financial and institutional capacity and experience dealing with FSM activities - containment and emptying • Existing plans and initiatives for improving FSM including Sanitation master plan and project on "City Partnerships for Urban Sanitation Service Delivery in Africa and South Asia" • Experience in FSM including current interventions in hauling fecal sludge/ waster as well as managing waste treatment plants, with a country monopoly • Potential to attract and manage financing for large infrastructure development for FSM eg for treatment centres	• Large volumes of fecal sludge generated, only 16% sewerage coverage • Increased interest and involvement of non-state actors in FSM eg. Exhausters and NGOs in reuse of sludge for energy • Existing plans and high demand for FS by-products for example energy and manure • Increasing financing for FSM in the country for cities and small towns • Facilitating policy environment that provides for decentralised service delivery • improved functionality/utilisation of existing treatment units •
WEAKNESSES	THREATS
• limited capacity of KCCA to undertake regulation and monitoring role • Limited involvement of the KCCA in downstream (treatment) activities and NWSC in upstream activities of the FSM chain • Largely a sewerage focus by NWSC • limited interventions/ service delivery to urban poor settlements; a key segment for high FS volume generation Limited FS treatment facilities.	• Unplanned settlements and weak regulation of land management making planning for infrastructure difficult
ONGOING SANITATION INITIATIVES	

• Kampala Capital City Authority
  • City Partnerships for Urban Sanitation Service Delivery in Africa and South Asia involving aspects on improving Fecal Sludge Management (FSM) for On- Site Sanitation in Kampala City
• National Water and Sewerage Company
  • Lake Victoria WTSAN project with a specific component on improving FSM in Kampala city
  • Implementation Partner in the City Partnerships for Urban Sanitation Service Delivery in Africa and South Asia	

ANGOLA

STRENGTHS	OPPORTUNITIES
• Approved master plans for water and sanitation in more than fifteen Angolan cities (capital of provinces); • Large scale emergency rehabilitation action for water supply and sanitation networks; • A state-owned company (case of ELISAL) responsible for the management of wastewater, fecal sludge and solid waste, especially in Luanda; • Building of large capacity systems for the treatment of wastewater collected by sewer	• Urban planning master plans to rehabilitate and improve the operation of water and sanitation assets and infrastructures; • Existence, since 2007, of the institutional development and human capacity building project in the water and sanitation sectors, financed by the GOA and the World Bank. • High OD and On-site sanitation rates in Angolan cities; • Rapid urbanization

systems in the cities of Benguela and Lobito.	• Ongoing study to clearly define and improve institutional framework for sanitation.
WEAKNESSES	THREATS
• Inadequate capacity and dilapidated state of water and sanitation networks and facilities in the most war-affected cities. • Inadequate or shortage of investments in sanitation infrastructures, • Many undersized sewage systems designed in colonial times for fewer people; • Insufficient and inadequate sanitation infrastructures in urban areas coupled with poor O&M by the responsible public utilities. • Limited capacity in the sector for FSM including shortage of skilled human resource, guidelines and strategy documents	• Isolation of some regions of the country due to the presence of landmines and the poor condition of rural roads (however, there is a demining plan and a rehabilitation plan for rural roads); •
ONGOING SANITATION INITIATIVES	
• No major project planned or underway in urban sanitation or fecal sludge management in Angolan cities.	

BURUNDI

STRENGTHS	OPPORTUNITIES
• A national directorate and technical and administrative services at the local level explicitly involved in the provision of urban sanitation services; • Availability in Bujumbura and in the secondary cities of sites that can be assigned and developed for the treatment of fecal sludge. •	• No dumping sites developed and controlled that meet dedicated health and environmental standards; • Lack of funding for fecal sludge management; • Lack of national fecal sludge management standards. •
WEAKNESSES	THREATS
• No dumping sites developed and controlled that meet dedicated health and environmental standards; • Lack of funding for fecal sludge management; • Lack of national fecal sludge management standards.	• Ongoing civil strife that doesnot allow for any meaningful development or even attract external financing sources •
ONGOING SANITATION INITIATIVES	
• No major project planned or underway in urban sanitation in general, let alone fecal sludge management	

CAMEROON

STRENGTHS	OPPORTUNITIES
• A national strategy for urban sanitation • Institutional capacity with national departments and technical and administrative services at the local level explicitly involved in the provision of urban sanitation services; • Availability of potentially assignable sites in Cameroonian cities as construction sites for fecal sludge dumping sites and treatment plants.	• Large volumes of FS generated • Dynamism of the private sector and existence of legislative texts; • Expressed will of public authorities to achieve the SDGs and climate conducive to the development of soft technologies; • Examples of successful waste management of the Camp Sic de Messa and the CNPS Hospital; • Strong political will towards sustainable provision of sanitation and efficient and effective fecal sludge management services.
WEAKNESSES	THREATS
• No developed and controlled sites that meet	• Poor governance (corruption); • Town planning constraints (proliferation of

dedicated health and environmental standards in the municipalities; • Inadequate funding for fecal sludge management; • Inadequate regulatory and normative framework (lack of building standards, discharge standards); • Limited infrastructure and human resource capacity for FSM;	informal settlements); • Lack of organization among drainers, whose number is very small if not otherwise non-existent in most secondary cities; • High cost of services, forcing households to resort to unhygienic practices.
ONGOING SANITATION INITIATIVES	
Douala, with the technical and financial support from the Bill and Melinda Gates Foundation plans to adopt a fecal sludge treatment plant that complies with the acknowledged rules of the art. Through the sanitation pilot project involving the construction of two fecal sludge treatment plants in Douala, this town will become the first Cameroonian city to adopt an adequate fecal sludge treatment system.	

CONGO

STRENGTHS	OPPORTUNITIES
• A validated sectoral strategy; • Availability of sanitation services at local and national levels requiring the involvement of sensitized populations; • Availability of urban solid waste landfill sites that will also serve as dumping sites for fecal sludge already identified in several urban centers: some landfills, like those of Lifoula in Brazzaville already have a validated technical study.	• High on-site sanitation rates • Existence of private sector in provision of emptying services
WEAKNESSES	THREATS
• Inadequate legal and regulatory framework, including a policy and a specific strategy for wastewater and excreta: Law No. 003/91 on environmental protection contains no provision on the disposal of solid and liquid wastes; no construction standards, discharge standards; • Limited institutional and infrastructure capacity for FSM in aspects of financing, human resource, regulation and FS treatment. • Ineffective performance of wastewater and excreta management sectors, including fecal sludge;	• Natural disasters eg repeated flooding in large cities (Brazzaville and Pointe Noire) • The political and security context in neighboring countries; • Lack of action plan for the implementation of the National Gender Policy whose dimension and financial allocation are not sufficient in urban sanitation sector programs; • Competing needs for the limited financial resources • Predominance of unstructured neighborhoods and accelerated development of spontaneous housing areas.
ONGOING SANITATION INITIATIVES	
• No major project in the field of fecal sludge management is being implemented in the cities of Congo.	

GABON

STRENGTHS	OPPORTUNITIES
• A national sectoral strategy for urban sanitation; • A national directorate and local technical and administrative services involved in the provision of urban sanitation services; • Availability in Libreville, Port Gentil and in secondary cities of potential sites for locating dumping sites and FS treatment units	• Clear intention of public authorities to achieve the MDGs/SDGs; • Strong political commitment for more mobilization for the improvement of city dwellers' living conditions through the sustainable provision of sanitation services and effective and efficient fecal sludge management services.
WEAKNESSES	THREATS
• Limited institutional and infrastructure capacity for FSM in aspects of financing, human resource, regulation and FS disposal and treatment • Inadequate regulatory texts for the fecal sludge management sector in Gabon including standards for wastewater discharge.	• The drainers are not organized and they are very few in number. There is none at all in most secondary cities in Gabon; • High cost of the service, forcing households to resort to unhygienic practices;
• No project or action to fund sanitation or fecal sludge management services has been announced.	

EQUATORIAL GUINEA

STRENGTHS	OPPORTUNITIES
• A strategy for urban development and modernization of urban infrastructures, including those related to urban sanitation and fecal sludge management. • The strong political commitment to sanitation improvement	• The clear intention of public authorities to equip all urban centers with modern infrastructures related to the provision of basic services including urban sanitation and sustainable fecal sludge management; • Private sector involvement in provision of emptying services.
WEAKNESSES	THREATS
• Lack of national discharge standards for wastewater and fecal sludge management; • Notable lack of harmony in the intervention methods in the operation of urban infrastructures, including those related to sanitation; • Lack of coordination between the various organizations involved in the provision of sanitation services; • Disparity in the parameters for the monitoring and evaluation of projects and programs; • Inadequate reliable data on FSM	
ONGOING SANITATION INITIATIVES	
• No project or funding for sanitation or fecal sludge management services has been announced.	

CENTRAL AFRICAN REPUBLIC

STRENGTHS	OPPORTUNITIES
• Operational policies and strategies advocating the development of sanitation services in CAR, including the promotion of filled pits draining and the revival of the sanitation market.	• Very high rate of non-sewered sanitation • Technology development for low income settlements
WEAKNESSES	THREATS
• Lack of discharge standards for wastewater and fecal sludge; • Lack of tools and strategies for the monitoring and evaluation of sanitation and fecal sludge provision services. • Limited institutional and infrastructure capacity for FSM in aspects of financing, human resource, regulation and FS treatment.	• Political instability limiting development efforts
ONGOING SANITATION INITIATIVES	
No project or funding for sanitation or fecal sludge management services has been announced.	

DEMOCRATIC REPUBLIC OF CONGO

STRENGTHS	OPPORTUNITIES
• Operational policies and strategies requiring the development of sustainable sanitation services in urban areas, including the promotion of filled pits draining and the recovery of the urban sanitation market.	• Political will at national and local levels for the development of sanitation services and the sustainable management of fecal sludge; • Strong demand for urban sanitation services and fecal sludge management in the cities.
WEAKNESSES	THREATS
• Limited institutional and infrastructure capacity for FSM including shortage of financing, human resource, regulation and infrastructure/ options for FS treatment and disposal.	• Poor infrastructure e.g roads to support development • Weak governance coupled with Fragmented institutions and governance structures at • Insurgency in some regions

SAO TOME AND PRINCIPE

STRENGTHS	OPPORTUNITIES
• A Water Master Plan with an investment program; • Targeted efforts to improve service delivery and internal processes like procurement that often limit realization of benefits • Political will at the local and national levels for the development of basic urban sanitation services and sustainable fecal sludge management in Sao Tome and Principe; •	• Adoption of a national strategy for the involvement of the relevant stakeholders to ensure the effective and efficient implementation of the programs; • Development of endogenous financing mechanisms making it possible to increase the budget allocated to the sector and support the water sector; • Adoption of a policy for the creation of several the following institutions to ensure the sound management of the sector: • Interest of external financial partners in the improvement of access to water and sanitation; • Strong demand for urban sanitation services and fecal sludge management in the cities of Sao Tome and Principe.
WEAKNESSES	THREATS
• Low access rates to basic services related to water and sanitation in the cities and villages of Sao Tome and Principe; • Failure at the political level to consider water as a strategic sector in terms of economic and social development; • Low investment budget implementation rates; • Lack of coordination of sector stakeholders and their interventions • Shortcomings in the implementation of donor procedures; • Limited institutional and infrastructure capacity for FSM including shortage of financing, human resource, regulation and infrastructure/ options for FS treatment and disposal as well as proper M&E mechanisms	• Collateral effects of the various international economic and political crises; • The high dependence on external aid/ financing • Political and institutional instability associated with too frequent, repetitive and recurring changes of government in Sao Tome and Principe (for example, in 10 years there have been seven changes or government or cabinet reshuffles).
ONGOING SANITATION INITIATIVES	
No project or action to fund sanitation or fecal sludge management services been announced.	

CHAD

STRENGTHS	OPPORTUNITIES
• Technical standards for stand-alone wastewater and excreta disposal systems in rural and semi-urban areas in Chad; • Operational policies and strategies advocating the development of sustainable sanitation services in urban areas in Chad, including the promotion of pit emptying and FS resource recovery	• Political will at the local and national levels for the development of basic urban sanitation services, including sanitation and sustainable fecal sludge management; • Strong demand for urban sanitation services and fecal sludge management in the cities of Chad
WEAKNESSES	THREATS
• Lack of technical reference and assets standards for sanitation and fecal sludge management in the cities in Chad; • Limited institutional and infrastructure capacity for FSM including shortage of financing, human resource, regulation and infrastructure/ options for FS treatment and disposal as well as proper M&E mechanisms.	•
ONGOING SANITATION INITIATIVES	
No project or action to fund sanitation or fecal sludge management services been announced.	

BENIN

STRENGTHS	OPPORTUNITIES
• The government is willing to set up a new institutional framework that provides better organization of private emptiers in charge of fecal sludge collection / transportation. • Sanitation Sector adequately addressed in the institutional architecture, with the existence of Ministry dedicated to sanitation.	• Very strong presence of onsite sanitation in cities. • Existence of private emptiers association in Cotonou and Parakou. • Finalized or ongoing studies for construction or rehabilitation of dumping sites
WEAKNESSES	THREATS
• Lack of legal text concerning fecal sludge. • Weakness of private emptiers (informality and Financial capacities). • Inadequate FS dumping sites, only one official site in the country. • No specific experience in fecal sludge management. • Limited public and private investment and capacity in the fecal sludge sector.	• Relatively low level of large segment of urban populations facing hight-emptying cost. • New institutional framework which provides public management • Management of dumping sites under state control, which might pose a problem of inefficiency
ONGOING SANITATION INITIATIVES	
• Abomey-Calavi and Cotonou-East: Feasibility study for the construction of FSTP has just ended. The funding provided by the KFW is available - It remains to complete land acquisition. • Sémé Podji and Cotonou-West:A study of rehabilitation, operation and extension of existing single dumping site is under way. • Parakou: NGO DCAM Bethesda plans to develop a FSTP for the city.	

BURKINA FASO

STRENGTHS	OPPORTUNITIES
• Sanitation Sector adequately addressed in the institutional architecture, with a Ministry dedicated to sanitation. • Fecal sludge dumping site based on biogas production under realization in Ouagadougou. This is the first experience of its type in sub-Saharan Africa.	• Very strong presence of onsite sanitation in cities. • Existence of private emptiers association in Cotonou and Parakou. • External investment in FSM e.g. Support from the Bill & Melinda Gates Foundation in Ouagadougou to develop a FS dumping site (biodigester)
WEAKNESSES	THREATS
• Lack of legal text concerning fecal sludge. • Weakness of private emptiers in terms of organization (informal nature) and Financial Capacities. • No specific experience in fecal sludge management. • Weakness of public and private investment in the fecal sludge sector.	• Prohibitive emptying costs to a large section of the urban population • New institutional framework which provides public management against the private management • Low public funding of the fecal sludge management sector.
ONGOING SANITATION INITIATIVES	
Construction of fecal sludge treatment plant funded by Bill & Melinda Gates.	

COTE D'IVORE

STRENGTHS	OPPORTUNITIES
• Ministry dedicated to sanitation. • Existence of legal texts concerning fecal sludge.	• Very strong presence of onsite sanitation in cities. • Existence of private emptiers association
WEAKNESSES	THREATS
• Lack of legal text concerning fecal sludge. • Weak private sector engaged in pit emptying with obsolete equipment, limited financial capacity	• Relatively low level of large segment of urban populations facing hight-emptying cost. • New institutional framework which provides public management against the private

and no fomal status. • Limited institutional and infrastructure capacity for FSM including shortage of financing, skills, human resource, regulation and infrastructure/ options for FS treatment and disposal • Weakness of public and private investment in the fecal sludge sector.	management
ONGOING SANITATION INITIATIVES	
• Abidjan, Yamoussoukro, Bouaké, San-Pédro and Korhogo: Ongoing projects for identification and organization of stakeholders, build their capacity and construction of fecal sludge dumping sites	

NIGERIA, GAMBIA, GUINEA, MALI, TOGO AND MAURITANIA

STRENGTHS	OPPORTUNITIES
• Mali and Mauritania have a Ministry dedicated to sanitation • Togo has an association of pit emptiers in Lome	• Strong presence of on-site sanitation in the cities. • Private sector engagement in FSM particularly in providing emptying services • External financing and involvement of non-state actors in FSM
WEAKNESSES	THREATS
• Lack of a Ministry dedicated to sanitation for Guinea. • Lack of legal text concerning fecal sludge and regulation of FSM activities. • No particular experience and limited investment in fecal sludge management. • Limited capacity of actors in FSM service delivery e.g human resource in public entities and private emptiers.	• A relatively low standard of living for a large segment of urban populations face the cost of emptying • Prohibitive costs for pit emptying services which may limit their demand/ uptake
ONGOING SANITATION INITIATIVES	
No ongoing action on fecal sludge management in Gambia, Mali, Guinea and Mauritania Togo: project of construction of FSTP in Sokodé funded by the African Water Facility and Plan International Togo.	

SENEGAL

STRENGTHS	OPPORTUNITIES
• Existence of a Ministry dedicated to sanitation. • Lack of legal text concerning fecal sludge. • Good experience in fecal sludge management. • Willingness of the Government to strengthen legislation to better organize the collection / transport of fecal sludge (license).	• High on-site sanitation coverage in the cities. • Ongoing project for development of fecal sludge sector in Dakar with a lot of potential for replication • External financing and stakeholders involved in FSM activities • Good organization of private emptiers.
WEAKNESSES	THREATS
• Weak capacity of private emptiers in terms of organization (informal nature) and Financial Capacities.	•
ONGOING SANITATION INITIATIVES	
• Dakar Region: implementation of a fecal sludge program including construction of a FSTP, delegation of FSTP management to the private sector, tests on the prototype of the omni-processor, loans to emptiers based on a guarantee fund, setting up a call center, updating legislation to incorporate licensing of the emptying activity. • Municipality of Touba: construction of a fecal sludge treatment plant.	

BOTSWANA

STRENGTHS	OPPORTUNITIES
• Capacity in human resource management and technical skills are available for management of the systems	• Demand for sanitation is high • Business opportunities • The country has developed a strategy to provide every citizen with access to sanitation

WEAKNESSES	THREATS
• Lack of funding • Lack of national programmes for non-sewered sanitation systems and FSM	• Tradition and cultural acceptance of The system
ONGOING SANITATION INITIATIVES	
•	

LESOTHO

STRENGTHS	OPPORTUNITIES
• Existing systems for FSM are already existing • Capacity in human resource management and technical skills are available for management of the systems • The system is already widely practiced	• Demand for sanitation is high • Business opportunities
WEAKNESSES	THREATS
• Lack of funding • Lack of national programmes for non-sewered sanitation systems and FSM	• Meeting environmental regulatory requirements
ONGOING SANITATION INITIATIVES	
• There are no FSM facilities operating in the country.	

MOZAMBIQUE

STRENGTHS	OPPORTUNITIES
• Existing systems for FSM are already existing • Capacity in human resource management and technical skills are available for management of the systems	• Demand for sanitation is high • Business opportunities • Private sector is already engaged
WEAKNESSES	THREATS
• Lack of human capacity at local level • Lack of funding • Lack of national programmes for non-sewered sanitation systems and FSM	• Tradition and cultural acceptance of the system • Meeting environmental regulatory requirements •
ONGOING SANITATION INITIATIVES	
The water supply in Maputo is provided through a regulated framework involving the asset owner (FIPAG), private operator (AdeM) and the regulator (CRA). Maputo has an extensive water network covering much of the city but lacks tertiary networks to the low income bairros. Consequently, until recently only about 20% of the low income households had an individual connection: about 50% purchased water from a neighbour, and about 30% purchased water from a kiosk owned privately or run/operated by the utility AdeM.	

NAMIBIA

STRENGTHS	OPPORTUNITIES
• Existing systems for FSM are already existing • Capacity in human resource management and technical skills are available for management of the systems	• Demand for sanitation is high • Business opportunities
WEAKNESSES	THREATS
• Lack of regulation tools by the regulator • Lack of funding • Lack of national programmes for non-sewered sanitation systems and FSM	• Tradition and cultural acceptance of the system • Meeting environmental regulatory requirements
ONGOING SANITATION INITIATIVES	
There are a number of FSM facilities currently existing in the country.	

SOUTH AFRICA

STRENGTHS	OPPORTUNITIES
• Existing systems for FSM are already existing • Capacity in human resource management and technical skills are available for management of	• Demand for sanitation is high • Business opportunities

the systems • There are strong regulatory tools	
WEAKNESSES	THREATS
• Lack of funding • Lack of national programmes for non-sewered sanitation systems and FSM	• Tradition and cultural acceptance of the system • Meeting environmental regulatory requirements
ONGOING SANITATION INITIATIVES	
There are a number of FSM facilities currently existing in the country	

ZAMBIA

STRENGTHS	OPPORTUNITIES
• Existing systems for FSM are already existing • Capacity in human resource management and technical skills are available for management of the systems	• Lack of regulation tools by the NWASCO • Lack of funding • Demand for sanitation is high • Business opportunities
WEAKNESSES	THREATS
• Lack of national programmes for non-sewered sanitation systems and FSM	• Tradition and cultural acceptance of the system • Meeting environmental regulatory requirements
ONGOING SANITATION INITIATIVES	
There are 3 FSM currently operated by Lusaka Water and Sewerage Company in Lusaka. The programme manages the entire sanitation chain from maintenance, conveyance, treatment and disposal.	

4.3.2 Models for replication

a. Overview

The sections above present the context and status of FSM in the study countries. Research and practice have shown that service delivery along the FSM chain is still challenging. Countries are constrained financially due to competing community needs, technologies are not well developed and used. Regulations exist to facilitate FSM activities, but the provisions therein are not adequately implemented and /or enforced. However, this dismal situation presents an opportunity for improved engagement. This is also supported by an enabling environment including stable governments that are committed to the well-being of populations, as well as institutions mandated for sanitation, with varying levels of capacity.

b. Best practices and promising initiatives

i. Promising models for FS containment, sustainable emptying services and FS treatment- Case of Senegal

The ongoing initiative to improve FSM, as part of the fecal sludge market structuring program supported by the Bill & Melinda Gates Foundation, presents promising practices and options. The project aims to (i) reduce the cost of emptying, increase the income of emptiers, enable sustainable management of sites developed for unloading and professionalize the emptying activity and (ii) improve non-sewer sanitation in flood zones. Key activities include: 1. testing the omni-processor as an optimal fecal sludge treatment option that produces electricity, promotes re-use through producing potable water and ash for soil conditioning, 2. business development support to emptiers through (i) a guarantee fund that provides low rate credit to emptiers for purchase of new trucks and spare parts (ii) setting up a call center for customer management (iii) policy revision to allow for licencing of emptiers and (iv) improving infrastructure to reduce truck haulage distances and thus opex to maximize returns and 3. developing appropriate on-site toilet options for flood zones.

So far, the project is still ongoing, and it presents promising replicable models in the three areas of fecal sludge containment, Pit emptying and FS transportation services and fecal sludge treatment. The omni processer is reported to treat about 30% of the fecal sludge in Dakar and is currently producing the three by-products.

Figure 7: Omni processor in Dakar

ii. Partnerships – potential for facilitating and improving FSM: case of Malawi

One of the objectives of the Malawi Peri-Urban Water and Sanitation Project, an EIB funded project, was to provide basic sanitation to 468,000 people in low income areas of the cities of Blantyre and Lilongwe by increasing latrine coverage. The project gave WaterAid, an NGO, small local concessions for the provision of services through kiosks and associated public sanitation facilities.

Figure 8: Latrine improvement

The collaborative model succeeded in rolling out 70,000 latrines through sanitation awareness building and marketing, training for slab builders, and setting up private pit latrine emptying services using the gulper and nibbler (van Gilst, Thomas 2008)

iii. Innovative resource recovery options for FS treatment – Cases studies of Kenya and Kampala, Uganda

The practice of fecal sludge reuse as an energy source (biofuel) has advanced in Kenya. The initiatives involve biogas production at specially designed public sanitation facilities locally referred to bio-centers. Civil society organizations, including Umande Trust, GOAL, and WSUP, have rolled out the concept, mainly targeting informal and unplanned settlements. Bio-centers are a sanitation innovation comprising a multi-purpose sanitation structures (see Figure 9 below) with toilet and bathroom-facilities[4], like operated on pay per use basis[5], that are designed to produce biogas and liquid fertilizer through anaerobic digestion in dome structures. These structures are typically managed by community groups. These centers originally targeted improvement of sanitation and livelihood informal settlements but have also been used at institutions (e.g. schools). Chowdry and Kone (2014) highlight the high coverage levels, with over 100 bio-centers recorded in Mombasa, Kisumu and Nairobi alone. The biogas from these units is harvested and used mainly as cooking fuel for beneficiaries at the facility. Daily output from a bio-center has been reported as 12 m^3 of gas per day.

Figure 9: Typical Bio-centre in Kenya - drawing and As built

According to Munala et al. (2015), several successes and benefits have been reported for this concept. For example, in Jasho Letu slum, Nairobi, the bio-centre established in 2007 has impacted the community positively with increased incomes, improved sanitation, and community financial management capacity. Several revenue streams including (i) toilets and showers where daily and monthly payment options available, all less than USD 2[6]; weekly revenues of Ksh. 7,000 (US$ 77.78) from this source have been registered; (ii) sale of cooking fuel (Ksh. 87(US$ 1) per litre) which has the additional benefit of greener energy options to the community; (iii) space rental for meetings and entertainment (eg. watching football matches); and (iv) operating a local grocery.

[4] In some cases like existing toilets have been connected to discharge into the bio-center and increase capacity
[5] This is only for facilities located in public places for communal use
[6] One time use Ksh. 5 (US$ 0.05) and Ksh. 10 (US$ 0.11) for toilet and shower respectively with monthly use costs at Ksh.150 (US$ 1.7)

Other initiatives include the FaME project in Uganda. FaME is a collaborative research project that aims to demonstrate innovative and profitable resource recovery options for fecal sludge treatment products that will generate revenue to improve the service chain and increase public and environmental health in urban centres of Sub-Saharan Africa. In Kampala, the project is piloting an industrial kiln (see figure 10below) as a demonstration of the technical and financial viability of using dried fecal sludge as a solid biofuel to burn clay products.

Demonstration kiln at Bugolobi WWTP Kampala, UgandaA

Clay products from the kiln

Figure 10: FS re-use options - FS Burning to fire clay bricks

The study found that energy producing options have highest revenue compared to status quo/end-use in agriculture. In addition, about 70% of surveyed industries were willing to use the fecal sludge provided: it did not emit foul smells when burnt, and it gave an equivalent or greater calorific value when compared to the fuels already in use. However, there is a health risk to workers if not well handled. The most promising fecal sludge end-use industrial applications were: the clay industries and the blacksmiths who were able to use their existing infrastructure and systems to optimize their kilns (Niwagaba, 2014).

iv. Advancing safe FS containment case of CLTS in Ethiopia

The sanitation activities in Ethiopia are largely driven by donors e.g. the WSP-funded program financed the Community-Led Total Sanitation (CLTS) program that has contributed to significant reduction in open defecation.

The Southern Regional Health Bureau applied the CLTS approach, based on “zero subsidy,” allows communities to develop own sanitation solutions that were affordable. The Health Bureau utilized a mass communication campaign to create awareness and advocate to households to construct their own latrines. The mass campaigns, coupled with close collaboration with all key stakeholders, helped to create buy-in, to build capacity, and solicit volunteer health promoters. The campaign used women to drive latrine construction and educate the population on the risks associated with open defecation and the benefits of safe sanitation. The volunteer health promoters were tasked to lead by example, to make house calls (accompanied by health workers) to persuade householders to build latrines, and to supervise the latrine construction. Morella et al. (2008) report that pit latrine ownership rose by over 200% from < 13% in September 2003 to >50% in August 2004.

v. Latrine emptying technologies - case of Gulper Tanzania

The region has seen more into including the Gulper, VACUTUG and Maped In 2007, WaterAid, in association with the London School of Hygiene and Tropical Medicine, introduced a hand pump for emptying pit latrines (see figure 11). This *Gulper* pump consists of a long vertical stainless steel rod (pump rod), raiser pipe, and two non-return valves. The pump rod is connected to a T-handle and a uPVC pump which lifts the fecal sludge.

Figure 11: Use of the Gulper for FS extraction

4.3.3 List of potential good mentors and mentees in the sub-region

Mentors and Mentees for the first round were identified based on the qualification criteria detailed in Table 5 and the assessment is largely based on responses provided in the questionnaire survey.

Table 5: Criteria for mentor and mentee selection

Mentees:	**Mentors:**
Countries, municipalities, utilities and operators with: i. Serving at least 200,000 inhabitants that are ready to make a strong commitment to participate in the WOP Africa program with a high likelihood of success. ii. Strong potential to improving performance in sanitation services through evidence of : a. existing sanitation strategic plan and operational framework b. ongoing or planned sanitation project within the next three years c. A past experience of involving in a partnership and good knowledge of WOP Africa program d. Existing dedicated service and personnel for sanitation services, iii. Some success stories or show-cases on sanitation, iv. Evidence of recognition as a performing utility/municipality on sanitation at national or sub-regional level.	Countries, municipalities, utilities and operators that: i. can demonstrate advanced improvements and best practices in sanitation and who can act as mentors in the WOP Africa program. i. Have participated in a previous partnership and or twinning program

The overlapping roles between water utilities and local authorities in provision of emptying services and complementarity in mandates for the other components of the FSM has to be catered to in the design of the mentorship program. Potential participants identified for the first round of the RASOP mentorship program are listed in table 6 below

Table 6: Potential participants of mentorship program

No	Potential mentees		Potential mentors	
	Municipalities/Utilities/ Operators	**Country/City**	**Municipalities/Utilities/ Operators**	**Country/City**
1	Bamako city council	Bamako (Mali)	L'Office National de l'Assainissement du Sénégal (ONAS)	Dakar (Senegal)
2	Yamoussoukro district	Yamoussoukro (Ivory coast)		
3	Yaounde Communauté Urbaine	Yaounde (Cameroon)		
4	Kampala City Council Authority (KCCA) and National water and Sewerage corporation (NWSC)	Kampala (Uganda)	Ethekwini municipality	Ethekwini (South Africa)
5	Lusaka Water and Sewerage Company Limited and National Water and Sanitation Council (NWASCO)	Lusaka (Zambia)		

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4. DIFFICULTIES ENCOUNTERED

Limited timeframe on the project: The timeframe allocated for the assignment was too short to allow for validation of the information obtained from both literature reviews and the questionnaire survey. This also contributed to the low response rate.

Limited responsiveness of key informants: The consultants experienced difficulty and delays in getting responses from some of the identified stakeholders despite several follow up attempts. This was further hampered by communication problems, for example limited telephone interconnectivity to facilitate meaningful contact and follow up on phone for countries like Ethiopia, language barriers, for example Portuguese in Angola.

Limited sources of data to make meaningful cross reference on the state of FSM in some of the countries: Key technical data for example that relating to sanitation infrastructure was difficult to obtain especially in the short duration of this assessment. Most of the general data/information obtained was limited to a few cities, and this was used to typify the country situation in some cases. In addition, the diversity and sometimes conflicting information from both the questionnaires and literature strained the synthesis of the data.

5. CONCLUSIONS AND RECOMMENDATIONS

Fecal sludge management is a weak link of past or planned programs in the cities and countries of the Africa. It has only gained prominence over the past few years, with dedicated actions being undertaken including research on options to improve service delivery across the FSM chain. Good practices in FSM, as exemplified in the cases highlighted here, indicate a growing level of commitment to improving FSM services. There are also opportunities for supporting local research for the development and promotion of urban sanitation solutions.

All the countries in East Africa have fairly similar characteristics and status with regard to fecal sludge management. Ongoing efforts to improve FSM need further development, particularly building onto research results as well as monitoring and following through on the outcomes of pilots. Keys areas for development include contextual and affordable technologies for containment and treatment of fecal sludge, models for PSP in emptying, and institutional strengthening.

In most cities, the emptying of on-site facilities is done both manually and mechanically. Choudhry and Kone (2012) evaluated delivery of this service in 30 cities in Africa and Asia and found that 34.3% of the households use manual services to empty their on-site sanitation facilities. The mechanical emptying services are run by private operators with minimal regulation by the city authorities. This highlights the potential market for mechanization of the collection system and the need for institutional reforms to restructure the FSM systems to enhance private sector participation. In addition, there is need to adopt a realistic business model for the pit emptying services. They also found that the cost of purchasing a second hand vacuum emptying truck in Africa was three times the price of purchasing a new vacuum emptying truck in Asia. In addition, the high operating costs (especially for fuel) limit the entry of private operators and introduce operational and environmental risks. Furthermore, safe disposal sites and sludge treatment plants are needed to complete the FSM cycle in an environmentally sustainable manner.

In cases where towns are located too far from treatment/disposal sites, construction of transfer stations at strategic locations is recommended. An area that requires further investigation is the management options for a FSM system that serves several towns and that has the component of a transfer station. Some work has recently been initiated in Uganda where a demand aggregation model has been proposed for FSM

Many of the cities/towns do not have sufficient fecal sludge treatment facilities, partly due to high infrastructure structure development costs and limited due to low sludge volumes. A business model would integrate mechanisms for improved coordination between institutions, the regulation of all cycles of the FSM chain by municipal authorities, the provision of fecal sludge treatment plants, and recognition of the critical role of the private sector in FS collection and transportation.

Private emptiers should be recognized as a fundamental stakeholder in the FSM chain. In Kenya, Malawi, and Uganda sanitation service level agreements (SLAs) are being piloted, and there is operating space for private sector albeit unregulated. This may include development of guidelines and regulatory instruments to govern their operations. This may also require identification of a business model that aims at the financial sustainability of the emptying business, including

marketing and provision of tax and business incentives to promote expansion of coverage and scope of operations to include management of water supply systems or public water points.

All countries have a regulatory framework for FSM with provisions for service delivery in the FSM chain. There is an argument for the need for better articulation of the roles and standards particularly pertaining to fecal sludge containment and emptying services.

This rapid assessment has also highlighted the overlapping roles of water utilities and local authorities in practice, including the regulatory provisions. Institutional strengthening to clearly define roles, build sufficient performance capacity, as well as devise transitional arrangements where role changes are envisaged is necessary. The similarity of contexts among countries also provides an opportunity for learning across similar entities in different countries. A thematic approach is recommended for this knowledge management and capacity development component. Examples include (i) resource recovery reuse of fecal sludge as a biofuel source as reported in Malawi and Uganda and (ii) models for improving latrine emptying service and PSP promotion, as implemented using the SLA in Kenya, Malawi, and Uganda.

The design of a mentorship program should be cognizant of the complementarity of roles and mandates of urban local authorities and water utilities regarding FSM. A tripartite model is recommended involving both parties as mentees to the mentor. A clear role definition and clarity of expectations are paramount. By design, local authorities may have to play a lead role/champion to achieve mentorship program objectives, given the overarching on-sanitation mandate.

LIST OF ANNEXES

1. LIST OF KEY INFORMANTS
2. REFERENCES

List of Key informants

Sub - Region	Country	Contact person	Organisation	Position and/or Designation
	Angola	Antonio MENEZES NINHO	Ministério de Ambiente	Head of Unidad Técnica Nacional de Saneamento Ambiental (UTNSA), Office of the Minsiter
	Burundi	Rémy NDAGIJIMANA	Ministry of Water, Environment, Land Planning and Urban Development	Assistant to the Minister of Water, Environment, Land Planning and Urban Development
		Thaddée NKESHIMANA	Ministry of Public Health	Executive at the Ministry of Public Health (Future) focal point of EAA in Burundi
	Cameroon	Emmanuel NGNIKAM	University of Yaoundé and ERA – Cameroon (NGO)	Researcher at Ecolytechnique of Yaoundé and National Coordinator of ERA – Cameroon (NGO)
		Emile TEMGOUA	Dschang Municipality and University of Dschang	Researcher - Faculty of Agronomy and Deputy Mayor of the Municipality of Dschang
		Magloire TINA	ERA – Cameroon (NGO	Technical Director
	Congo	Eugène IKOUNGA	Minister of Energy and Water	Engineer – Advisor
		Georgette INGANI	EAA – Congo	Resident Representative
		Guy Alain NGOUALERE	EAA – Congo	Program Officer
		Omer MAHOUKOU	EAA – Congo	Projects Officer
	Gabon	MOUCKOCKO OLIVIER	Minister of Energy and Water Resources	General Director of Water Resources
		Gervais NGEMA MBA	Minister of Energy and Water Resources	Sanitation Director – DGRH,
		France – Lyne JOUNAS	Minister of Energy and Water Resources	DGRH
		Rostand LEPONDO	Shared Management of Solid Wastes (PRONAGU)	Coordinator of the National Program
	Equatorial	Guy Alain NGOUALERE	EAA	Program Officer

	Guinea	Omer MAHOUKOU	EAA	Projects Officer
	DRC	Edmond Bundutidil MBENZA		National Executive Secretary of the National Committee for the Water and Sanitation Action
		Bernard KABORE	EAA in Central Africa	Regional Program Officer
	CAR	Maxime Socky YANDJA	EAA – CAR	Resident Representative
	Chad	Oumar Yoro BARRY	EAA – Chad	Resident Representative
		Haroun Abdou MAHAMAT	Ministry of Rural and Village Water	Head of the Sanitation Department
	ETHIOPIA	Mr. Letta Yetamo	Hawassa Town Water Supply and Sewerage Service Enterprise	General Manager (Past)
		Mr. Hamaro Logita	Hawassa Town Water Supply and Sewerage Service Enterprise	General Manager (New)
		Arif Mohammed Ahmed	Harar Water Supply and Sanitation Authority	CEO
		Bushra Mohammed	Dire Dawa Water Supply and Sewerage Authority	Branch Manager Dire Dawa
		Fekadu Zeleke	Addis Ababa Water and Sewerage Authority	Acting General Manager
		Fiseha Behulu	Addis Ababa Water and Sewerage Authority	Head, Sanitation
	KENYA	Rachel Makhoka	Nakuru Water and Sanitation Services Co. Ltd	Managing Director
		Eng. David Onyango	Kisumu Water and Sewerage Company Ltd	Managing Director
		Eng. Jura Moses Odhiambo	Kisumu Water and Sewerage Company Ltd	Head of Technical Services
		Festus K Ng'eno	Kericho Water and Sanitation Co.Ltd.	Managing Director
		Eng. Peter Karanja	Kericho Water and Sanitation Co.Ltd	Technical Services Manager
		Phillip Gichuki	Nairobi City Water and Sewerage Company	Managing Director
	TANZANIA	cyprian luhemeja	Dar Es Salaam Water & Sewerage Corporation	Managing Director
		Eng. Sitta Mashaka	Mwanza Water and Sewerage Authority	Managing Director
		Danford Kamenya	Moshi Municipal council/ Mwanza city council	Head of cleansing and environment department
	MALAWI	Gabriel GONANI	Lilongwe Water Board	General Manager
		Hilary Kamela	Lilongwe city council	Director of Planning and Development
		Vitto Mulula	Lilongwe city council	Director of Health and Social Welfare Services

		Dr. Emmanuel Kanjunjunju	Blantyre city council	Director - Health services
	UGANDA	Eng. Alex Gisagara	National Water and Sewerage Company Ltd	DIRECTOR - Engineering services
		Eng. Paddy Tumwesigye	National Water and Sewerage Company Ltd	DIRECTOR - Planning and capital development
		Dr. James Ssemuwembe	Kampala City Council Authority	Deputy director public health
	BENIN	Salifou CISSE	PUGEMU/Cotonou.	Chief of Mission Technical Assistance
	BURKINA FASO	Adama KONE	WSA	Resident Representative WSA.
	COTE D'VOIRE	André Kouamé N'Guessan	ONAD	Assistant Director of Planning and Development,
	GAMBIA	Chaba Saidy		Department of Water Resources
	GUINEA	TRAORE Mory Fodé Seydou		Department of Water Resources
	MALI	Mahamadou Kaya		Director of Sanitation, Control of Pollution and Nuisance.
	MAURITIANA	Ahmed Weddady		Director of Sanitation
	NIGERIA	Engr. Emmanuel Chukwudi EZE	Federal Ministry of Water Resources, Abuja	Deputy Director (Water & Sanitation)
	SENEGAL	Pape Soumaré		Responsible Qualité and Environment
	TOGO	LAWANI Waïdi		Resident Representative WSA
		TCHONDA Tetouehaki		Ing. Génie Sanitaire et Environnement.
	Zambia	Douglas Singanga	MLGH	Principal Engineer
		George Ndongwe	Lusaka WSC	Managing Director
		Charles Shindaile	Southern WSC	Managing Director
	Botswana	Kene Dick	Ministry of Minerals Water and Energy Resources	Acting Managing Director

		Pelotshwen Phofnetsile	Ministry of Minerals Water and Energy Resources	Deputy Director (DWA)
	Lesotho	Fella Seboko	Lesotho Electricity and water Authority	Technical Manager- Water
	Mozambique	Messias Macie	Ministry of Public Work, housing and Water Resources	Director of Water
		Magalhaes Mignel	CRA	Secretary
	South Africa	Justine Lupindu	Nzo District Municipality	Technical Consultant – Support Agent
	Namibia	Ferdinand Brinkman	Municipal of Windhoek	Chief Engineer
		Enos Chulu	Municipal of Windhoek	Section Engineer – water and wastewater reticulation

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