



## **Financing Sustainable Water Service Delivery of Small Town Water Systems in Ghana: The Gaps and Needs**

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Cite as: Kumasi, T. C., Financing Sustainable Water Service Delivery of Small Town Water Systems in Ghana: The Gaps and Needs, *J. sustain. dev. energy water environ. syst.*, 6(3), pp 427-445, 2018, DOI: <https://doi.org/10.13044/j.sdewes.d6.0195>

### **ABSTRACT**

Rural water coverage in Ghana is on the increase, yet there are real concerns about the level of service received and sustainability of water supply systems. One of the reasons is the lack of systematic maintenance because of inadequate funding and unreliable cash flow for Capital Maintenance Expenditure. This paper highlights the current gaps and needs of water management models in three districts using focus group discussion and key informant interviews to collect qualitative and quantitative data. The study revealed that the mechanism inherent in the National Community Water and Sanitation Strategy for addressing Capital Maintenance Expenditure works for systems that have been implementing it. Limited capacity and weak management characterize water systems with inadequate mechanism to address Capital Maintenance. Results showed limited awareness and application of water sector guidelines for the management of the piped systems by the management models and the districts. This paper contributes to the literature on funding mechanisms for small town systems sustainable water delivery in Ghana. The study concludes that to effectively address sustainable water delivery in small town systems, governance, operations and financial management regimes in line with the water sector guidelines are critical to bring about the necessary change in the management models. This calls for stronger supervisory and oversight responsibilities from Community Water and Sanitation Agency and the District Assemblies.

### **KEYWORDS**

*Capital maintenance expenditure, Ghana, Management models, Service delivery, Water and sanitation management teams, Governance, Operations, Financial management.*

### **INTRODUCTION**

Rural water coverage has been increasing across Ghana with current coverage estimated at 62.03% at the end of 2016 [1]. Nonetheless, the actual level of service (20 litres per capita per day, within 500 m, 95% functional in a year, 300 persons using a handpump/spout and of good water quality) [2] received by users in many communities is low, below the basic level prescribed by Community Water and Sanitation Agency (CWSA). Reasons contributing to the poor water service levels include inadequate direct support, asset maintenance and repair at community level [3, 4]. Undeniably, in many cases, donors or government agencies only repair formal rural water points through unplanned processes of maintenance, rehabilitation, or replacement. Thus, there is no structured asset management in place resulting in a high cost process of providing rural

communities with poor services [5, 6]. Safeguarding to ensure that capital maintenance takes place is crucial to the sustainability of Water, Sanitation and Hygiene (WASH) systems. Service failure leads to the need for significant capital expenditure to renew or replace an asset [7]. Studies have shown that service levels have been maintained as the asset is sustained regularly and more efficiently [6]. Arrangement for ensuring sustainable water services demands the availability of funds to pay for the initial investment, operations, repairs, replacement, rehabilitation and the expansion of the systems as the demand increases. This means that all the service life cycle cost has to be taken into consideration [4, 6, 7].

Capital Maintenance Expenditure (CapManEx) is defined in the CWSA District Operational Manual (DOM), as the cost for occasional asset renewal, replacement and rehabilitation of WASH facilities. CapManEx costs may be covered by tariffs, user fees or through the local government budget. CapManEx deals with major maintenance whereas Operation and minor maintenance (OpeEx) deals with minor maintenance. Minor maintenance is defined as repair that is within the financial capability of the users of the facility, and covered by their user fees. Major maintenance is repair that is beyond the financial capability of users and cannot be fully covered by user fees, therefore requiring external support from local/central government or other sources [8]. Major maintenance is interchangeable with capital maintenance expenditure.

A study by Adank *et al.* [9] revealed that 33% of water points in Ghana were non-functional and a further 30-40% of the water points delivering services below the basic acceptable levels (partially functioning with downtime of more than 18 days a year). The poor functionality of rural water points demonstrates poor asset management. Other factors contributing to the poor services are the lack of sound financial management, accounting and auditing practices, and lack of preventive maintenance by the Water, Sanitation and Management Teams (WSMTs) [6].

Management by WSMT is a common model for majority of Small Town Water Systems (STWS) in Ghana [10]. Members of WSMTs are elected and delegated the management of the system by the District Assemblies (DAs). The roles and functions of WSMTs vary depending on the size and complexities of each system. If the system is small (i.e. serving between 2,000 and 10,000 people) the management, operation, maintenance and the financial management of the system is normally undertaken by WSMT members and by salaried technical and operator staff. Although with these systems and increasingly with the larger systems serving over 10,000 people, the technical and management functions of the WSMTs are being contracted to the private sector. This can range from simple operation and maintenance contract with local professionals, to the transfer of the whole system management to the private sector with oversight from WSMTs. Irrespective of the arrangement the WSMT exercises an overall management responsibility for the small town system and is required to ensure that sound administrative, technical and financial management practices are observed [11, 12].

Several assessments conducted into the sustainability of small town water systems have consistently pointed to weaknesses in the management of operation and maintenance of the systems particularly in the areas of cost recovery and financial management [13, 14] as well as governance resulting in declining service levels. In many instances, small town water services have not been able to meet system rehabilitation, extension, upgrade and replacement needs. Consequently, these systems have not been able to adequately respond to the need for major repairs and rehabilitation, nor have they been able to respond effectively to increased demand for water. Unlike larger towns or cities, these smaller towns often lack the financial and human resources to independently plan, finance, manage and operate their water supply systems [15, 16], hence the importance of direct support from CWSA and local government.

STWS in Ghana are confronted with inadequate funding for CapManEx from WSMTs and the districts, coupled with unreliable cash flow for CapManEx [11]. When sufficient funds are not set aside by WSMTs for CapManEx, systems would have to rely on donors or district assemblies. However, funding from donors and district assemblies are often unreliable and leads to extended periods of service downtime or substandard water service delivery [9, 17].

Understanding how capital maintenance expenditure is funded in small town systems from three different geographical settings in Ghana is vital in developing localized strategies and policies to engrain financial sustainability. This paper addresses the question on “how capital maintenance expenditure is financed in the context of the bye-laws governing the operations of small town water systems”. The specific objectives are to:

- Determine the functionality and nature of breakdowns in small town’s water systems;
- Identify the management models in operation, the gaps and effectiveness of their governance and financial management for improved water service delivery;
- Examine alternative funding mechanisms for financing capital maintenance by WSMTs.

The paper argues that though the concept of Community Ownership and Management (COM) model is commendable, there are gaps in the lack of enforcement of the bye-laws to ensure that district assemblies provide direct support to the WSMTs. The paper takes the position that small town systems in Ghana can be self-financing, sustainable if realistic tariffs are charged, and the revenue properly managed and accounted for. The rural water sector needs to change significantly, to ensure that direct support in the form of post construction support is happening routinely to ensure the operations, governance and financial management of the systems and the WSMTs are working effectively to guarantee sustainability.

## **METHODS**

The methodology adopted for the study is presented below focusing on the sampling of interviewees, the tools, data collection, analysis and validation of the results.

### ***Sampling***

Respondents for the interviews were selected from the districts using purposive sampling. This non-probability and non-representative sampling technique was adopted because it allowed the interviewers to focus on particular characteristics of the study population to meet the research objectives. Data was collected on all 16 WSMTs managing small town systems serving more than 2,000 users in the districts. This is because in the rural water sub-sector of Ghana, small towns are defined as communities with population between 2,000 and 50,000 [14, 18]. Key informant interviews were also conducted with eleven financial institutions at the district and regional levels using guiding questions.

### ***Data collection***

Both quantitative and qualitative data were collected from sixteen piped systems. Quantitative data were obtained from the operational records on system components and capacities, expenditure disaggregated into operations, maintenance, water revenue, tariff structures and service levels for the small town in the study districts. Qualitative data collected was grouped into the following themes: overview and functionality of systems, management models, funds mobilization and financing capital maintenance expenditure and alternative financing mechanisms for addressing capital maintenance expenditure.

Quantitative data was collected with the use of Android phones, and the qualitative data was collected through Focused-Group Discussions (FGDs) and key informant interviews. CWSA regional staff collected both qualitative and quantitative data. The data collection processes entailed the training of facilitators, rapporteurs and translators on conducting focused group discussions and key informant interviews. Data collection process was supported and supervised by staff from the CWSA Head office.

Primary data was collected between April and June 2016. Questionnaires used for the data collection were pre-tested. FGD consisting of 6-8 discussants was used to collect data from the District Assembly and the WSMTs. Two FGDs was conducted per district, one each with the WSMTs and district staff. Key informant interviews were conducted with financial institutions. Preliminary findings from the study were validated in each of the district with the WSMTs and district staff.

### ***Data analysis***

Primary and secondary quantitative data were analyzed using Microsoft Excel software. While secondary data employed service monitoring data collected in 2014 on performance of WSMTs for small towns in the three districts. The baseline data collected was assessed against indicators and benchmarks related to governance, operations and financial management based on national guidelines. Qualitative data analysis involved identification, examination and interpretation of patterns and themes in the textual data from the focused group discussion and determination of how these patterns and themes responded to the guiding questions using content analysis. The qualitative data was used to triangulate the quantitative data.

## **RESULTS**

The results first highlight the water situation in the districts and the procedures recommended for rural water service delivery in Ghana. This background seeks to contextualize the findings of the study on the operations, governance and financial management of small town systems. Lastly, the operations of financial institutions in supporting the WSMTs to finance CapManEx is presented.

### ***Study area***

Akatsi South district is located in the Southeastern part of Volta region in Eastern Ghana (Figure 1). The district has an estimated population of 98,684 with a growth rate of 2.4% [19]. At the end of 2015, the average water coverage for Akatsi South district was 60.03%. Akatsi South district is endowed with 197 boreholes fitted with handpumps, 4 Small Town/Communities Piped Systems and 1 Limited Mechanized System [20].

East Gonja district is located at the Southeastern section of the Northern region of Ghana (Figure 1). The total land area of the district is 8,340.10 km<sup>2</sup>, occupying 11.95% of the landmass of the Northern region, making it the largest district in the country [21]. The population demand for water in the district is very high. According to CWSA baseline data collected in 2014, East Gonja district has 130 boreholes fitted with handpumps, 10-piped systems and low water coverage of 30.45%. Functionality of these boreholes fitted with handpumps stood at 57% with non-functional handpumps estimated at 40%. The 10-piped systems are managed by eight WSMTs [20].

Kintampo South district is one of the 27 districts within the Brong Ahafo region of Ghana (Figure 1) and one of the six newly created in the region. The district covers an area of 1,774.85 km<sup>2</sup> and comprise of about 122 settlements [22]. The district has 267 boreholes fitted with handpumps (out of which 33 were broken down), four limited mechanised systems and three piped systems in 2014. With these facilities, the district's water coverage stood at 72% in 2016. Performance of WSMTs and the DA's functions

were identified as poor, and would be addressed in their 2017-2020 Water and Sanitation Plan [20].

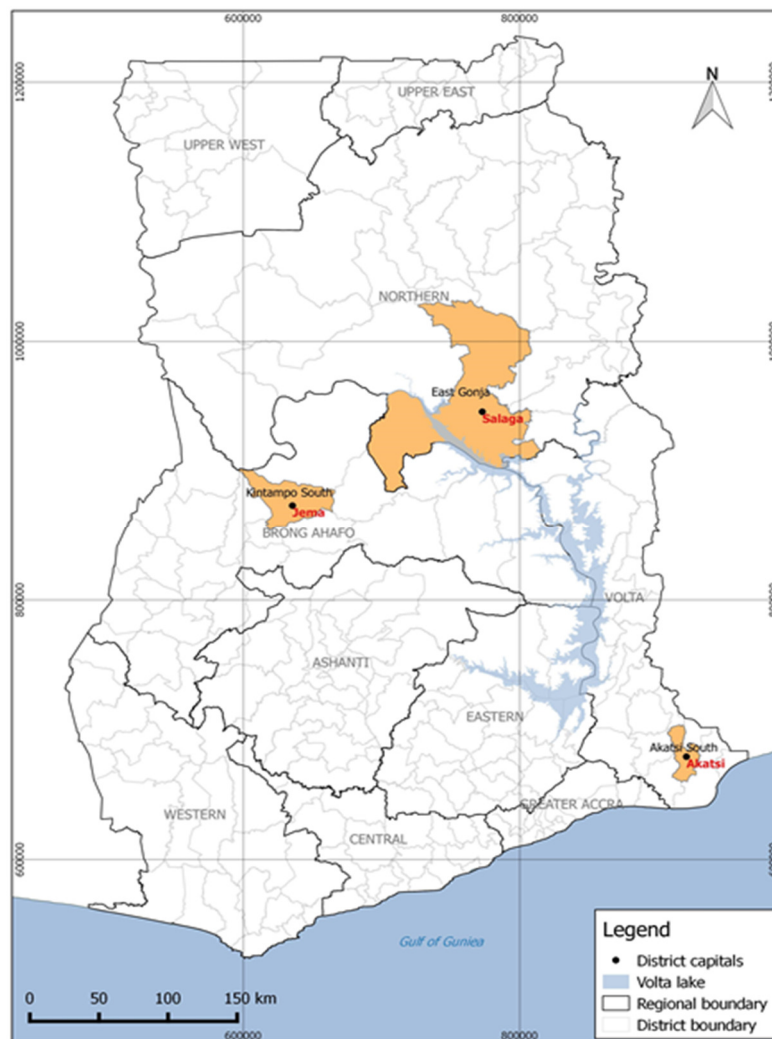


Figure 1. Map showing locations of the studied districts in Ghana

### ***Guidelines for rural water service delivery in Ghana***

The national commitment to ensure sustainability of WASH facilities provided to rural communities and small town, under the National Community Water and Sanitation Programme (NCWSP), is based on the COM strategy. Legal ownership of water supply systems is vested in the DAs, who hold this in trust for the communities. Communities are responsible through their respective WSMTs for the everyday management of these systems in line with the tenets of community management [23].

DAs are the focal point for delivery of WASH facilities. The DAs are mandated to plan, budget and implement their own water and sanitation programmes. They are also responsible for the approval of tariffs, the appointment of water service providers and oversight of community management to ensure compliance. WASH services are also guided by the tenets of good governance and transparency [23]. The private sector has the responsibility to deliver the needed goods, works and services through contractual arrangements.

WSMTs are established in each small town and rural community for the overall management of water supply and sanitation facilities. The formation and operation of the WSMT is guided by the national model bye-laws. WSMT are responsible for setting tariff and exercise this responsibility in consultation with the community. The portion of

the tariff for major rehabilitation, expansion and replacement are to be invested to add value and safeguard against depreciation [18, 24] (Figure 2).

According to the model bye-law for the establishment and operations of WSMTs:

- WSMT shall review and recommend water tariffs, service fees and penalties to the DA for consideration and approval at least yearly;
- WSMT are to establish at least three accounts, designated as ‘Operational Account’, ‘Capital Account’ and ‘Sanitation Account’ for managing its finances;
- WSMTs are to make payments of all revenue accrued from water sales and other receipts to the Operational Account and are to pay from the said account all the regular operation and maintenance costs;
- WSMTs shall make a monthly payment to the Capital Account at a figure to be determined by the WSMT but not less than 20% of the net monthly revenue accrued to the WSMT after all regular operation and maintenance costs have been paid. The DA may allocate funds yearly through budgetary allocation to the Capital Fund;
- Each year the WSMTs are to prepare a work plan and budget for the operation and maintenance of the water system with technical assistance from the district;
- The books and accounts of the WSMTs are to be audited annually by auditors approved by the DA within three months of the end of the immediate previous financial year. The DA is to approve the audit report. A summary of the audit report shall be posted on the community notice board [24].

The community, as citizens and customers, has a key role to play in ensuring sustainable service delivery. This role includes expressing demand for services and indicating their preference in terms of levels and quality of service and affordability, making payments for services provided, registering complaints where services are not according to set standards and demanding accountability from service providers (Figure 2, [23]).

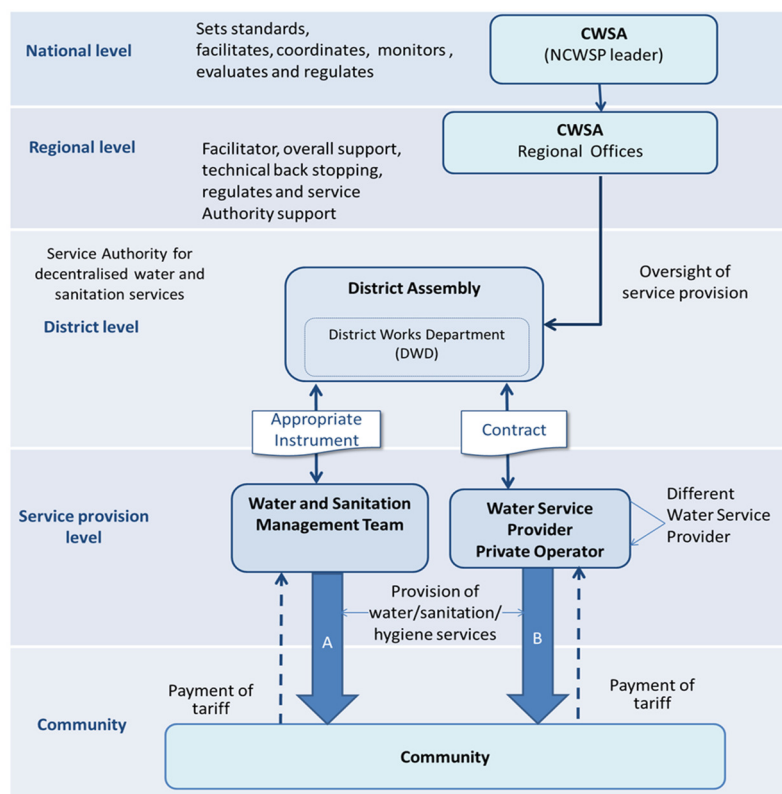


Figure 2. Institutional relationships within the Community Water and Sanitation sub-sector [23]

**Functionality of small town systems**

Results of the study revealed that 15 out of 16 piped systems were working. The age of systems ranged between 2 to 52 years (Table 1). Akatsi system had a malfunction distribution bulk meter and replaced two pumps at the cost of USD 3,698. In Lume-Avete with the exception of the float-valve, all components of the piped system were working and had not experienced any major breakdown in the past 12 months. According to Avenorpedo and Dagbamete WSMTs, piped systems suffered major break down in the past 12 months. However, more than half of the systems were working, though intermittent shutdown lasting one to seven days in the last one year was reported. Reasons included land dispute, non-functional control panel, pump and damage of pipelines because of road construction and farming activities.

Table 1. Overview of small town water systems in Akatsi South, East Gonja and Kintampo South districts

District	Piped system	Year of construction	Status
Akatsi South	Akatsi	2004	Functional
Akatsi South	Avenorpedo	1996	Functional
Akatsi South	Dagbamete	1998	Functional
Akatsi South	Lume-Avete	1998	Functional
East Gonja	Salaga	1965	Functional
East Gonja	Kpembe	2011	Functional
East Gonja	Kpalbe	2006	Non-functional
East Gonja	Makango	2011	Partially functional
East Gonja	Daboashie	2011	Functional
East Gonja	Dashie	2011	Functional
East Gonja	Talkpa-Abromasi	2012	Functional
Kintampo South	Jema	2015	Functional
Kintampo South	Anyima	2015	Functional
Kintampo South	Amoma	2014	Functional
Kintampo South	Krabonso	2014	Functional
Kintampo South	Nante	1999	Functional

Salaga system is a complex surface water treatment plant that draws and treats water from Daka River for consumption. The system is huge, old and almost all its components have been replaced or repaired, including change of pumps, extension of pipes and some portions of the transmission lines, and maintenance work at the pump house. Funds were not readily available for all the major maintenance works that needed to be carried out so external support came from Canadian Department of Foreign Affairs Trade and Development (formerly CIDA), and the DA, taking more than one month to fix.

Kpalbe system is a solar powered slow sand filtration system – water from the dam is pumped through sand filtration media that treats water for consumption. The system provided under the Guinea Worm Eradication Project has broken down for the past 7 to 8 years. It is non-functional because of pipe burst, pollution of source water by animals and malfunctioning of the media. It has been abandoned because the community had difficulty mobilizing funds to fix it. Daboashie system unlike Kpalbe depends on bulk water supply from Ghana Water Company Limited (GWCL), which is stored in three overhead polytanks. The bulk water supply is erratic and occasionally takes 2-3 months for the WSMT to be served. In the last year, two of the polytanks have burst and the third one leaks. Furthermore, the meter at the vending site has stopped working. The only repair work ever carried out was worth USD 5 in 2016 and this was for repair works on a standpipe.

Dashie has a mechanized system with bulk water supply from GWCL connected to two overhead polytanks and characterized by erratic water supply and this translates to 2-3 months downtime in a year. The system has never broken down, however, one of the overhead polytanks leaks and not fixed due to lack of funds. Talkpa-Abromasi system is a five-year's old mechanized borehole powered by solar (Table 1). Water is pumped and stored in an overhead polytank. In the last 12 months, a minor problem occurred with the pump but the community organized communal labour to mobilize funds to fix the problem in a week.

In Kintampo South District, two solar mechanized systems with only public standpipes are available at Amoma and Krabonso. Nante system is a surface in-take with household connections. The remaining two piped systems at Anyima and Jema depend on mechanized boreholes with power from the national electricity grid (Table 1). A complete shut-down was reported for only Jema piped system in the 12 months preceding the data collection. This breakdown lasted for about a month and was caused by a fault on the drop out fuse and lightning arrestors. Complete shutdown was also reported for the piped system at Krabonso when it was being test-run and under the management of World Vision Ghana. The breakdown was caused by defects on the submersible pump and the pump replaced as part of project's cost, under defect liability period.

### *Small town water system management models*

In this study, three management models were identified as direct, partial and private operators. Out of the sixteen small town water systems, ten were directly managed by the WSMTs, four were partially managed and two by private operators (Table 2).

Table 2. Small town systems, management models and relationships with the districts

District	Piped system	Management model	Relationship between the WSMTs and the district
Akatsi South	Akatsi	Partial	Cordial
	Avenorpedo	Direct	Cordial
	Dagbamete	Direct	Cordial
	Lume-Avete	Direct	Cordial
East Gonja	Salaga	Partial	Cordial
	Kpembe	Private operator	No relationship
	Makango	Private operator	No relationship
	Kpalbe	Direct	Cordial and non-responsive
	Daboashie	Direct	Not cordial and non-responsive
	Dashie	Direct	Cordial but non-responsive
Kintampo South	Talkpa-Abromasi	Direct	Bad
	Jema	Partial	Cordial
	Anyima	Partial	Cordial
	Amoma	Direct	Cordial but non-responsive
	Krabonso	Direct	Cordial but non-responsive
	Nante	Direct	No relationship

Majority of WSMTs (7 out of 16 WSMTs) have extremely cordial relationship with the DAs. According to these WSMTs, the DAs are responsive to the challenges that confront them. Others had cordial relationship with the DAs (5 out of 16) but it was revealed that the DAs were not responsive to the challenges reported to them. While there was no relationship between some of the WSMTs and the DAs (3 out of 16), others (1 out



of 16) reported of bad relationship with the DAs. Majority of the STWSs whose management had good relationship with the DAs were either directly or partially managed by WSMTs. Private operators managed STWSs had no relationship with the DAs (Table 2).

In Akatsi South, although there exist a good relationship between the DA and the WSMTs, according to the WSMTs, frequent visits will strengthen the existing relationship. In East Gonja, Salaga, Dashie and Daboashie WSMT members were of the view that if the operations of the systems were ceded to private operators, the systems would perform much better and minor repairs such as replacement of faulty tanks would be fixed promptly.

Though the DA plays a general supervisory role in Dashie, the WSMT is of the view that, its relationship with the team and issues relating to water was unresponsive. Daboashie and Kpalbe have no cordial relationship with the DA since several complaints sent out to the DA did not yield any positive outcome. Talkpa-Abromasi WSMT described the relationship between them and the DA as bad. Apart from the Environmental Health Officer who visits the area occasionally, they scarcely interact with the DA. Kpembe and Makango management and the private operator hardly have anything to do with the DA.

WSMTs at Amoma and Krabonso however mentioned that their work could be enhanced if given the necessary support from the DA, in the form of refresher training and the requisite record books. With the exception of Nante WSMT, all the others indicated that there were some form of interaction between them and the DA. Interactions between the WSMTs and the DA staff occurred through audit meetings and visits on demand. WSMTs however indicated that these forms of interactions did not occur on regular basis.

Akatsi and Salaga systems supply water to government institutions such as hospitals, clinics, Police service, Prisons and Senior High Schools. These institutions are highly indebted to the WSMTs because they default in paying their bills regularly. In the case of Salaga, some of the institutions owe arrears of up to three years. In a bid to address some of these challenges, Akatsi WSMT has taken legal action against some defaulters to retrieve monies owed the system.

Kpembe and Makango systems are privately owned and managed by WaterHealth Ghana, a wholly owned subsidiary of WaterHealth International in partnership with DAs and communities through a Public Private Partnership (PPP) model. It uses the Build, Operate and Transfer (BOT) approach to delivering water. WaterHealth Ghana was established in 2007 to provide safe, scalable and affordable drinking water to underserved communities. The private operator prefers managing Kpembe system to the WSMT. A WSMT has been constituted alongside the private operator due to persistent plea from the community to be involved in management of the system. Although a WSMT has been constituted, they feel sidelined in the management. As their views are never considered with regards to issues pertaining to the day-to-day running of the system. However, it is not the standard practice to have a WSMT for private facilities. The financier of the system- WaterHealth Ghana adopts the market-based approach that seeks to recoup the investment. Kpembe system supplies water to the Nursing Training College unlike Akatsi system, payment for water appears not to be a problem.

In Kintampo South, with the exception of Nante and Amoma where the current group of WSMTs begun their work in 2011 and 2014 respectively, the remaining three WSMTs started managing their respective piped systems in 2015. Piped systems at Amoma and Krabonso did not have meters at the public standpipes, making it difficult to track quantity of water vended and total revenue that ought to be generated from the sale of water. Controlling of private connections was reported as a major problem at Nante. Only 12 out of 41 private connections in the community were done with the involvement of the

WSMT and most of these private connections were not paying monthly bills. An individual without recourse to the WSMT did the other private connections for the WSMT.

### ***Financial management of small town water systems by management models***

WSMTs interviewed in Akatsi South were aware of CWSA guidelines for setting water tariffs. Nevertheless, only Akatsi WSMT used the tariff guideline. The rest indicated that they were unable to use the guideline because of their limited capacity and resort to community consensus. All the WSMTs rely on revenue generated from sale of water for major repairs and stated that in case they are unable to meet the cost of any repairs or replacement, they intend to increase tariff, organize fund raising and apply for a bank loan as a last resort. Avenorpedo WSMT would consider increasing water tariff due to the high operational and maintenance costs. Akatsi WSMT submitted their last tariff to the DA in December 2015 for approval prior to its implementation in January 2016. Afterwards, the WSMT submitted a revised tariff of 0.023-0.035 cents per 18-litres due to high electricity bills to the DA for approval (Table 3). All the WSMTs admitted publicly rendering accounts to the community once a year during Christmas and at community durbars. Akatsi WSMT in addition submitted quarterly returns on their transactions to the DA for scrutiny.

Akatsi South district Assembly confirmed that all the WSMTs operate bank accounts, however only Akatsi WSMT operated all three required accounts while Avenorpedo WSMT operated operational and capital accounts. Lume-Avete and Dagbamete operated only operational accounts. Akatsi South DA has sufficient knowledge of budget-based tariff, which is derived from all the cost elements of operating and maintaining a water system. They are also cognizant that WSMTs have to present a proposed tariff to the DA for approval before implementation. According to the DA, only Akatsi WSMT followed CWSA guidelines for tariff setting. Other WSMTs in the district did not submit their proposed tariffs for approval even though the DA alluded the WSMTs were aware of the procedures. The prevailing tariff of 0.006 cents per 18-litres at Lume-Avete, Avenorpedo and Dagbamete was unrealistic and in the opinion of the DA contributed to the inability of WSMTs to generate sufficient funds to meet their operational and capital maintenance cost (Table 3).

Kpalbe WSMT admitted the tariff was not realistic and could not sustain the system. They assert that since the water project was targeted at eradicating guinea worm, they felt obliged to motivate residents to patronize potable water and stop fetching surface water. They agreed it was difficult to set tariffs based on the guidelines. Kpalbe only source of fund mobilization for major repairs was through meager tariff and individual donations until the system eventually broke down.

The situation was completely different in Talkpa-Abromasi as the WSMT did not set a tariff. They practice a levy system where every woman pays 0.12 cents on Fridays, irrespective of the quantity of water drawn for the whole week. The WSMTs attempt to implement 0.047 cents per 36 litres tariff was unsuccessful. The WSMT counts on the high communal spirit of the people to mobilize funds to undertake minor repairs whenever the need arises. However, the system is barely 5 years old and has not encountered any major maintenance problem. The WSMT through meetings with sectional leaders and community disseminate information including the finances.

Daboashie WSMT set no tariff based on the guidelines as in the case of Kpalbe. A tariff of 0.023 cents per 36-40 liters of water was implemented for some time but it was not able to meet bills charged by Ghana Water Company Limited for water it distributed to their storage tanks. The tariff was reviewed upwards to 0.047 cents per 36-40 litres, which is being implemented currently. This has resulted in majority of the dwellers

fetching surface water. The WSMT is not able to account to the people because of poor attendance.

Table 3. Small town water systems tariffs in Akatsi South, East Gonja and Kintampo South Districts

District	Piped system	Water tariff regime	Water tariffs
Akatsi South	Akatsi	Pay-as –you fetch	0.023 cents per 18-litres
	Avenorpedo	Pay-as –you fetch	0.006 cents per 18-litres
	Dagbamete	Pay-as –you fetch	0.006 cents per 18-litres
	Lume-Avete	Pay-as –you fetch	0.006 cents per 18-litres
East Gonja	Salaga	Pay-as –you fetch	0.047 cents for 54-60 litres, USD 1.16 per day for household connections
	Kpembe	Pay-as –you fetch	0.023-0.047 cents dependent on volume
	Makango	Pay-as –you fetch	0.023-0.047 cents dependent on volume
	Kpalbe	Pay-as –you fetch	0.012 cents per 36-40 litres
	Daboashie	Pay-as –you fetch	0.047 cents per 36-40 litres
	Dashie	Breakdown maintenance	Community contribute when there is a breakdown
Kintampo South	Talkpa-Abromasi	Weekly unlimited supply	0.12 cents on Friday
	Jema	Pay-as –you fetch	0.023 cents per 18-litres
	Anyima	Pay-as –you fetch	0.023 cents per 18-litres
	Amoma	Pay-as –you fetch	0.023 cents per 18-litres
	Krabonso	Pay-as –you fetch	0.023 cents per 18-litres
	Nante	Pay-as –you fetch	0.023 cents per 18-litres

WaterHealth Ghana determines Kpembe and Makango system tariff regime, which is not in line with the tariff guidelines. Tariff rates range between 0.023-0.047 cents depending on the volume of the container. Funds mobilization for addressing major repairs was not disclosed but did not appear a problem. The private owner does not account to the people nor the DA.

The Salaga system operates both tariff and levy system. However, the tariff is arbitrary, not taking into consideration all that is spelt out in the tariff guidelines. Households connected to the system pay USD 1.16 per day for the number of hours water is rationed whereas those who fetch from the public standpipes pay 0.047 cents for 54-60 liters. Nevertheless, the WSMT asserts that realistically, 18 litres of water should cost 0.140 cents. The main source of funding major repairs is from revenue generated from sale of water. Some external support especially from the DA occasionally fund some major maintenances. The WSMT mostly resort to Radio Stations to account to the people on the running of the system.

Dashie WSMT did not set any tariff and for that reason, had no knowledge of the CWSA tariff guidelines. They allow community members to fetch water free but levy each household to raise money any time they were served a bill from GWCL. The system has no institutional connections. The WSMT apparently has no plan in place for addressing major maintenance should the system suffer one. Information on the operations and management of the system is disseminated through community meeting. East Gonja DA admitted that they were aware of the guidelines for setting tariffs. The district nevertheless conceded that the DA in recent times has not approved any tariff,

nor was any of WSMTs practicing realistic tariff – setting regime in the district. They also indicated that the WSMTs operate only operational accounts. It was further revealed that the Salaga system owed an accumulated electricity bill of USD 46,512. WSMTs did not prepare annual budget and financial statements because of the low educational level of the members. The district confirmed several attempts to carry out technical and financial audit of the systems. However, these initiatives were abortive for the Salaga system because in instances where auditors requested for their financial books, the WSMTs never honored the request.

Clearly Avenorpedo and Dagbamete systems expenditure exceeded income in 2012, 2013 and 2015 and Akatsi and Lume-Avete income also exceeded expenditure from 2012-2015. Strikingly was the huge cost of utilities Akatsi and Avenorpedo had to pay in 2015 because of increase in electricity tariffs (Table 4). There was no data from East Gonja WSMTs income and expenditure from 2012-2015.

Table 4. WSMTs in Akatsi South income and expenditure from 2012-2015

Description [year (USD)]	Akatsi WSMT				Avenorpedo WSMT				Dagbamete WSMT				Lume-Avete WSMT				
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	
Income	Income																
	Water income	23,325	30,067	36,201	41,501	244	1,378	3,098	2,310	1,733	2,044	2,223	2,541	496	501	546	535
	Other income	2,348	1,129	3,069	8,299	760	244	35	116	0	0	0	4,385	0	0	0	0
	Salaries	2,325	4,007	4,897	7,239	0	0	0	0	0	0	0	0	0	0	0	0
	Utilities	3,791	5,011	5,195	10,581	848	847	598	1,099	311	357	372	440	0	0	0	0
	Administration – newspaper, bank charges, meeting cost, cleaning	589	808	921	1,175	153	119	98	89	49	57	73	69	0	0	0	0
	OpeEx																
	Minor repairs – source, pipes, pumps, storage	1,184	846	1,037	403	49	123	106	157	143	255	263	312	118	159	228	149
	WSMT allowance	561	1,324	1,678	1,593	677	851	851	851	0	0	0	0	28	28	28	28
	Transportation – T&T, fuel	1,194	1,326	2,111	1,511	70	49	28	67	0	0	0	0	12	14	14	12
	Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expenditure	Rehabilitation of water system	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Major repairs	0	0	0	3,717	519	337	845	349	0	0	0	0	0	0	0	0
	Asset replacement	2,816	1,436	1,509	3,717	0	0	0	0	1,395	0	0	1,628	0	0	0	0
	Others	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
	CapManEx																

All WSMTs in Kintampo South adopted pay-as-you-fetch as the principal means of funds mobilization. A tariff regime of 0.023 cents per 18-litres was charged in almost all the piped system communities except at Amoma where the WSMT charged 0.023 cents per 36-litres (Table 3). None of the WSMTs interviewed operated sanitation and capital accounts. Nante, Krabonso and Amoma explained they were not aware of the guidelines recommendation for operating three bank accounts. Although Anyima and Jema were mindful of operating three accounts, they felt their money was too small to open three accounts. All the WSMTs noted that revenue from sale of water was banked in their ‘Operational Accounts’. This phenomenon allowed WSMTs to draw money for the day-to-day running of their water systems (operations and maintenance as well as administrative expenditure), with no ring fencing of funds for CapManEx. This stems partly from the lack of routine monitoring and enforcement of the guidelines by the DAs.

Four out of the WSMTs surveyed in Kintampo South were not aware of the existence of the guidelines for setting water tariffs, and therefore did not use it in determining water tariffs. Similarly, only one out of eight staff of the District Assembly during the Focused Group Discussion session had knowledge of the existence of guidelines for setting tariffs. WSMTs, which did not use the tariff guidelines, indicated that, they pegged their rates at the prevailing tariffs of nearby communities, which also operated piped systems, and considered user’s willingness and ability to pay in agreeing on a tariff of 0.023 cents per 18-litres (Table 3).

Three of the WSMTs interviewed mentioned that they would consider increasing their water tariffs in consultation with the community. They explained that the cost of

operations and maintenance was increasingly expensive (Table 5). Tariff increment was contemplated by some WSMTs who wanted to generate enough money while the systems were still new, to finance capital maintenance expenditure in the future.

Table 5. WSMTs in Kintampo South District annual income and expenditure for 2015

	Description	Jema	Anyima	Amoma	Krabonso	Nante
Income	Water income	13,941	3,543	1,079	560	4,200
	Other income	553	317	0	0	0
Operational expenditure	Salaries	1,221	1,186	502	182	586
	Utilities	6,830	1,403	0	0	836
	Administration – newspaper, bank charges, meeting cost, cleaning	334	675	315	12	Not available
	Minor repairs – source, pipes, pumps, storage	3,380	493	60	86	791
	WSMT allowance	186	231	126	26	335
	Transportation – T&T, fuel	490	39	50	34	106
	Others	0	0	0	0	0
	Capital maintenance expenditure	Rehabilitation of water system	0	0	0	0
	Major repairs	0	0	0	0	0
	Asset replacement	0	0	0	0	0
	Others	0	0	0	0	0
Bank balance	Balance as at December 31, 2015	551	886	563	395	1,887

Aside revenue generated by WSMTs for funding major repairs, Kintampo District Assembly indicated that it had set aside 2% of its total budget (USD 13,622) to support WASH activities in the 2016 Composite Budget [22]. The district noted that this budget would be drawn from the DAs Common Fund allocations. This budget line was considered by the district as adequate to support the small town piped systems because the systems were not likely to experience breakdown at the same time. Therefore, the current budget allocations would be enough to assist the various WSMTs to finance their repair works if required. According to the DA, financial support to WSMTs to meet the cost of major maintenance needs is strictly demand driven. Based on the magnitude of the repairs (major or minor) and the available savings of the WSMTs, support is provided. The district indicated that unless otherwise stated, financial support to WSMTs are not expected to be paid back because water facilities are assets of the DA. They however expressed grave concern on the seeming lack of submission of WSMTs tariffs to the DA for review and approval in consultation with CWSA Regional Office, as required by the water sector guidelines [25].

### *Alternative financing mechanisms for CapManEx*

Apart from funds mobilized from water tariffs, support from the DA and other donors, bank loans were considered an alternative. Eleven banks in the districts were interviewed on the financial operation of the WSMTs. The banks never granted loan to any WSMTs simply because they received no loan application from them. They indicated the possibility of granting financial assistance to WSMTs provided the application requirements were met. In their view, operating an active account as well as the inflows and outflows and collateral were key to granting a loan. When probed on whether banks could use water systems as collateral for granting loans, all showed no interest as they rejected this proposition. GCB Bank Limited in Salaga alluded to the bank's core mandate as purely business. Of the three banks surveyed in Akatsi South, Avenor Rural Bank confirmed holding the accounts of more than twenty WSMTs including the four

WMSTs interviewed in this study. Akatsi WSMT operates daily deposit with the bank and this leads to efficiency in funds mobilization and management.

The Appraisal requirements for accessing loan from the banks surveyed included the following:

- WSMTs must have accounts with the banks for at least one year;
- The WSMT must submit a loan application form to the bank. If the application is evaluated and it meets the standards, the bank will request for a collateral in the form of landed property, which is properly valued and documented;
- Audited financial statement of the WSMT;
- Constitution for the operations and activities of the team;
- Guarantee letters from Municipal/District Assemblies;
- Income generation capacity of the various piped systems determines the magnitude of loan ceiling and the WSMTs ability to pay back loans;
- Bank official(s) make an enquiry visit to the WSMTs to evaluate their loan request.

The financial institutions indicated that loans to WSMTs are treated as commercial, with varying interest rates per year: 33% (Avenor Bank, GCB, Bonzali Rural Bank, GN), 19.5% for BACSSOD, 32-37% for ADB, 32% for Kintampo Rural Bank and 35% for Sahel Sahara bank. Loan repayment is calculated in monthly installment. The appraisal and loan application requirements were almost the same across all these institutions except for GN Bank, which had an extra requirement in the applicants having a guarantor who should be a customer of the bank.

## DISCUSSION

According to the CWSA framework for assessing and monitoring rural and STWS Services in Ghana [26] functionality of a standpipe is assessed by whether or not water flows at least 85% of the designed rate (a given quantity/unit time). Although a facility can be functioning at a given point in time but is not providing an acceptable level of service. There is thus a need to assess functionality, but also to take into account other aspects of service delivery. The level of service can be defined in terms of the quantity and quality of water provided and the ease of accessibility of the service, in terms of distance and maximum number of people per facility, here referred to as 'coverage' and its reliability [26, 2]. Service level indicator gives an indication of the degree to which service provided by the water facility is in line with the minimum standards for rural and small town water service delivery.

In line with the monitoring framework, data collected in 2014, showed that functionality of STWSs was 80% and only one out of ten STWSs provided a basic service in East Gonja. Basic service level defined in the framework as level IV when the piped system provides service as per design standards for population category and meets all the sub-indicators (quantity, quality, reliability and accessibility) [27]. From the data, it was observed that 4 out of 5 STWSs were fully functional with the Akatsi system partially functioning in Akatsi South district. None of the four STWSs in Akatsi South was delivering basic water service [20]. This observation is worrisome and further suggests concerns with sustainability of small town water service delivery.

Clearly, there are gaps in the relationships between WSMTs and DAs in East Gonja and the private operators. DAs are responsible for oversight of community management to ensure compliance [18, 25]. Regulation of small town water services is a major weakness in Ghana. Furthermore, regulatory arrangements for small town water services are often absent or vague [28, 29].

WSMTs yet require technical, administrative and institutional support [9] to effectively comply with the guidelines and sustain water service delivery. Additionally,

the DAs are noted to be confronted with a myriad of challenges of inadequate numbers of skilled staff, lack of office space making them inefficient in meeting deadlines [30-32] and delivering on their mandate of sustainable water services. The lack of sense of ownership of water systems by some DAs and communities coupled with lack of technical and advisory support by DAs to WSMTs has been alluded to by [33, 34] and this stems partly from lack of human, financial capacities and commitment.

There is a seemingly high default by government institutions connected to direct or partial managed systems and the story is completely different when these institutions are connected to private managed systems. According to the bye-laws, WSMTs are required to ensure water systems are financially viable. Subsequently tariff setting should ensure sustainable finances for the operation and maintenance of the system and mirror inflation and depreciation of the Ghanaian cedis [24]. Defaulting government institutions obviously compound the problems of WSMTs. It is therefore laudable that Akatsi WSMT has instituted legal action to retrieve monies owned the system.

Sixty percent of WSMTs in East Gonja expressed interest in the DA contracting a private operator. While delegated management appears, the last resort it can only be efficient and effective if there is clear regulatory arrangements and instrument. Specifically clear contract durations, roles and responsibilities, modalities for support to the WSMTs and local government, funding mechanisms that fuel pro-poor investments and a well-resourced CWSA and DA to provide the needed oversight functions [28, 35].

It has to be noted that irrespective of the management model and degree of private sector involvement, there is a need for clearly defined roles and responsibilities related to management, suitable levels of technical and managerial capacity and clear funding mechanisms for covering OpEx and CapManEx of assets [28]. Though private sector participation in the provision of water services puts more emphasis on these elements of professional water service provision, professionalism is not synonymous with private sector involvement.

It is obvious that the systems in Kintampo South with the exception of Nante system are new and did not appear to have capital maintenance demand excluding Jema. This observation is in line with [36] and [32] who noticed that community ownership and management of small town systems perform well when the facilities are new. As systems get older, they perform poorly due to lack of proper maintenance, because of inadequate revenues generated over the years as in the case of direct managed systems in East Gonja. Although Amoma, Anyima and Jema were new systems, their expenditure exceed revenue in 2015, this observation is a cause for concern (Table 5).

According to Burr *et al.* [11], a key characteristic of successful small-town systems is their ability to fund capital maintenance from their capital accounts. Indeed when sufficient finances are not set aside, it is left to donors and the DA to service these costs. This funding is often unreliable and leads to extended periods of service downtime or sub-optimal performance. Simply financing major maintenance may not treat the root causes of the problem. Rather it is important that sufficient financial management and maintenance regimes are in place to ensure that the service keeps going.

Undoubtedly, over 80% of WSMTs interviewed have no knowledge of the guidelines for setting tariffs and as a result do not use the guidelines in setting realistic tariffs. WSMTs do not tend to charge a tariff that is sufficient to service capital maintenance costs [9]. Besides WSMTs pegging their rates at the prevailing tariffs of adjoining communities and users willingness and ability to pay for small town water is alarming [10, 17]. This is because tariffs are determined based on several factors. All water production and distribution expenses, routine maintenance and other contracts, repair work, water quality monitoring, tariff collection expenses, replacement cost, rehabilitation and expansion, sanitation fund and contingency are key determinants of a realistic tariff [12]. In line with the guidelines, WSMTs are to develop a work plan and

budget for the ensuing year based on the elements for calculating realistic tariffs for submission to the DA for approval. It was only Akatsi system that complied. Because of non-compliance to tariff guidelines, incredibly low tariffs were charged.

Pay-as-you-fetch which is the recommended mode of payment appears to work better in the southern zone than in the northern zone. Also the demand for potable water was low because users who were not happy with the tariffs immediately abandon the system and resort to surface waters as was observed in East Gonja. The WASH Cost 2011 study [9] noted that small towns are confronted with low actual water use usually far lower than the design capacity, resulting in low revenues. Furthermore, in four small towns in Ghana, about a third of the users were found to use less than the designed amount of 20 litres per person per day. This observation affects the revenue generated from the system to sustainably operate it.

Furthermore, Acheampong [34] noted that STWS WSMTs performance were affected by the local and socio-economic conditions of the location of small towns in addition to geophysical characteristics such as rainfall pattern and ground water quality, coupled with willingness to pay for water services. The socio-cultural contextual of communities played a key role in determining their willingness to pay for water. These culminated in considerably low demands from small towns, which adversely affect production levels. For instance, daily water consumed ranged from 8 litres per capita to 2 litres per capita per day at Parambo-Sawaba and Kokofu, respectively [34]. This observation was contrary to the CWSA guidelines of 20 litres per capita per day for a spout and 60 litres per capita per day for a household connection.

Technical and managerial capacities of some WSMTs were cited as reasons for their inability to fully comply with the guidelines. Ensuring that WSMTs have the requisite skills and capacities are key factors to be considered. Also they require appropriate technical training and refresher training on their roles and responsibilities for effective maintenance, operation and management [37]. Refresher training coupled with routine monitoring is vital to ensure compliance to the guidelines.

In a few instances some of the WMSTs were rendering accounts, but this was yearly or on ad hoc basis and in violation of twice a year as recommended in the guidelines.

## CONCLUSIONS

The concept of Community Ownership and Management, though laudable, has some notable setbacks. Professionalization of the service providers, stronger supervisory and oversight responsibilities from CWSA and the District Assembly is necessary to bring about the needed change. Beneficiary communities need some form of external assistance in terms of periodic technical backstopping, monitoring and supervision from the DA and CWSA to manage water supply systems sustainably.

The main sources of finance are tariffs, contribution from DAs and in a few instances, grants from Donors. Financial management of all WSMTs was weak and in dire need of support. With the exception of Akatsi WSMT, none of the WSMTs had a capital account to finance major maintenance activities in the future and this should be exemplary for the others.

There was no control over the disbursement of funds generated by the various WSMTs and this could lead to funds mismanagement and inappropriate expenditure. This situation could further aggravate the poor culture of accountability by the WSMTs to their respective communities. Tariff setting was done arbitrarily by almost all the WSMTs, tariffs being used by WSMTs were not submitted to the DA for approval.

In the three districts studied, WSMTs simply flouted operational, governance and financial management roles and responsibilities. Communities practicing some form of cost recovery mechanisms (i.e. collect tariffs for operation and maintenance) are not able to plan and mobilize enough funds for capital maintenance repairs. The reasons are due to



poor management, low and unrealistic tariff and poor revenue collection efficiency. For WMSTs to effectively manage funds generated, they require support and routine monitoring to ensure that they are doing the right thing.

This paper further buttresses the point that small town systems could be self-financing and sustainable if realistic tariffs are charged, funds properly managed and accounted for. It is only when the service levels are improved that users will be willing to patronize the use of the systems as in the case of privately managed systems. From the study, it is therefore concluded that what is critical to effective sustainability of small town water systems in Ghana relates to governance, operations and financial management regimes of the WSMTs to bring about the necessary change in enhancement of water service delivery.

## RECOMMENDATIONS

Given that WSMTs/DAs are not managing the small towns in line with the principles of the National Community Water and Sanitation Strategy (NCWSS), CWSA should sensitize the DAs/WSMTs on the NCWSS especially on mechanism to address CapManEx and STWS governance. It is also important to take into consideration the socio-cultural differences in the sensitization process. In addition, CWSA should monitor the operations of all WSMTs and this may require additional budgetary allocation at all regional and head offices.

DAs should intensify monitoring and support roles including budgeting and tariff setting to the WSMTs. Regular monitoring visits, capacity building, technical backstopping to the WSMTs, periodic technical and financial audit of the systems will ensure efficient fund mobilization and management. The mandatory monitoring activities may require increase in budgetary allocation to the Water Unit of District Works Department to ensure that the unit is able to monitor regularly.

Formation and one time training of WSMTs is not enough. Regular refresher trainings in operation and management will ensure that they are abreast with their responsibilities. The various management structures and their functions would have to be professionalized (proper reconstitution with educated members, gazette constitutions, binding contracts, proper financial management, etc.), to be able to benefit from the services of financial institutions. This calls for greater collaboration from all stakeholders.

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Paper submitted: 29.07.2017

Paper revised: 04.12.2017

Paper accepted: 10.12.2017