Community-based Management of Small Town Water Systems in North-western Ghana: Performance and Institutional Analysis

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Nicholas Fielmua

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Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

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Dedication

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Abstract

The state-led provision and management of potable water in rural and small towns has been decentralised with the ultimate aim of ensuring reliable and continuous access to water because previous institutional arrangements have failed to do so. Community-based water management (CBWM) has been a product of these policy reforms. CBWM has received support from international and donor communities, pushing many developing countries, including Ghana, to adopt the approach. It is assumed that community level actors, as compared to state-led and other non-state-led actors, are closest to the water resources and are in a better position to devise strategies to manage these resources. In fact, since its inception, studies have highlighted the challenges and successes of this approach. However, while CBWM in the rural areas has been widely researched, little is known about it in small towns, thus creating a skewed understanding of the approach. Moreover, studies on CBWM tend to focus on selected performance indicators and fail to question the institutional underpinning of such performance outcomes. Therefore, this study seeks to examine the performance-institutional linkage of small town water systems by examining (i) the pattern of interactions among the actors; (ii) the rules that guide their interactions; and (iii) the outcomes of their interactions. This study offers an institutional perspective on CBWM in four cases in North-western Ghana. Based on the institutional analysis and development (IAD) framework, different but complementary data collection methods are used to allow a holistic analysis of institutional arrangements and their performance outcomes. This study confirms that CBWM in North-western Ghana is associated with a well-thought-out institutional arrangement that has the potential to provide sustainable access to water. This study however argues that the presence of stressors, including entrenched socio-cultural ties, limited capacity and commitment, opportunistic behaviour and power asymmetries, adversely affect the functioning of the institutional arrangements. Therefore, it argues for a re-examination of the assumed *simple* relationship between CBWM approach and the improved performance of its water systems as well as its appropriateness in small towns as a function of the population-size of the communities it serves. This study advocates that future research on CBWM should seek to understand how the institutional arrangements affect and are affected by the performance of the water systems in small towns.

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List of Abbreviations

ANOVA	Analysis of variance
CAS	Complex adaptive systems
CBWM	Community-based water management
CWSA	Community Water and Sanitation Agency
CWSP	Community Water and Sanitation Programme
DA	District Assembly
DACF	District Assembly Common Fund
DMTDP	District medium term development plan
DPPC	Distribution point for private connections
DWSTs	District Water and Sanitation Teams
FGD	Focus group discussion
GSS	Ghana Statistical Service
GWCL	Ghana Water Company Limited
GWSC	Ghana Water and Sewerage Corporation
HDW	Hand-dug well
HHS	Household survey
HLT	High level tank
IAD	Institutional analysis and development
IDWSD	International drinking water and sanitation decade
IRC	International Water and Sanitation Centre
MMDA	Metropolitan, Municipal and District Assemblies
MWRWH	Ministry of Water Resources, Works and Housing
NCWSP	National Community Water and Sanitation Programme
NDPC	National Development Planning Commission
NGO	Non-Governmental Organisation
OER	Operating expense ratio
PPP	Public-Private Partnership
SPSS	Statistical Package for the Social Science
SSA	sub-Saharan Africa
SSNIT	Social Security and National Insurance Trust
STWS	Small town water system
UWR	Upper West Region
WHO	World Health Organisation
WRC	Water Resources Commission
WSMT	Water and Sanitation Management Team
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VRA	Volta River Authority

1 Introduction

1.1 Overview of the study

The rural and small town water sector is one that has gone through transformation in developing countries, especially in sub-Saharan Africa (Saleth and Dinar, 1999, Giné and Pérez-Foguet, 2008, Christina et al., 2013, Villamayor-Tomas et al., 2015). The sector has evolved from central government provision and management through community participation to the current community management approach, with the ultimate aim of promoting sustainable water services delivery (see elaboration in section 1.2 below). With considerable donor support, community-based water management (CBWM) became the preferred delivery approach with many developing countries, including Ghana, adopting and implementing CBWM in small towns[1] and rural communities. Since its implementation, several studies in many countries (see, for example, Carter et al., 1999, Doe and Khan, 2004, Giné and Pérez-Foguet, 2008, Schouten and Moriarty, 2003, Moriarty et al., 2013, Cleaver and Toner, 2006, Opare, 2011, Harvey and Reed, 2004, Narayan, 1995, Fuest, 2006, Eguavoen, 2008, Harvey and Reed, 2006a) have highlighted its successes and failures (elaborated in sections 1.2.1), especially in rural areas.

While the rural component of CBWM has received extensive research, little is known about the application of this approach for small town water systems (see also Mugabi and Njiru, 2006, Tortajada, 2010a). More importantly, in instances where there have been studies in small towns, the focus has been on performance measurement, without a critical analysis of the institutional arrangements for CBWM or an in-depth assessment of implementation. Studies measuring performance of CBWM in small towns have called for its reform (see, for example, Moriarty et al., 2013, Smits et al., 2013, Gbedemah, 2010, Doe and Khan, 2004), as demonstrated in section 1.3 below. This study argues that analysing performance measurement alone causes a misrepresentation of CBWM and fails to understand its dynamics in small towns. As such, this study argues for an integration of institutional analysis into the study of CBWM in order to ascertain causes of the existing performance and an analysis of what prevents the institutional arrangements from evolving to respond to any performance failures. Specifically, this study focuses on an analysis of community-based management of *potable* water in small towns in Ghana.

In adopting an institutional approach the research uses the institutional analysis and development (IAD) framework (see section 4.3) to examine the institutional arrangements for CBWM, taking into account *how* actors interact based on a set of rules within a particular action situation (CBWM) to produce performance outcomes. The research was conducted in North-

[1] Although there are varied explanations of small towns (see chapter 2), in Ghana, they are settlements with population between 2,001 and 50,000 (CWSA, 2010).

western Ghana using four cases of small town water systems (see section 5.2). Since Ghana launched the National Community Water and Sanitation Programme (NCWSP) in 1994 considerable progress has been made in increasing access to water (see chapter 5 for details). North-western Ghana (Upper West Region) has the highest potable water *coverage* (76.13%) as compared to the national average of 63.66% as at the end of 2013 (NDPC, 2011, CWSA, 2014b). Paradoxically, the Region also has the highest poverty incidence (70.7%); substantially above the national average (24.2%) (Ghana Statistical Service, 2013a). These intriguing statistics in the Region and other socio-economic characteristics, as elaborated in chapter 5, make the region particularly suitable for the study. Although access to water through infrastructure development is often linked to discussions on poverty, Wendy and Bakalian (2009) argue that the challenge in Ghana is not with implementation (the country is doing well with regards to planning and implementation) but with the lack of capacity to maintain water services over time.

The remainder of this chapter is organised into three sections. Section 1.2 presents the detailed evolution of CBWM, indicating the policy shifts and the outcomes (successes and failures) in the water sector. This provides an opportunity to frame and contextualise the research problem, from which the research questions emerge, as explained in section 1.3. The scope, limitations of the research and the structure of the remaining chapters are presented in section 1.4.

1.2 Background of community-based water management

Water supply has been seen as part of the discipline of engineering and consequently has suffered from the engineering mind-set of “design and build” (Harvey and Reed, 2004, Ferragina et al., 2002, Pahl-Wostl et al., 2011), with little attention to institutional and managerial issues (Ferragina et al., 2002, Cleaver and Toner, 2006, Armitage, 2005, Saleth and Dinar, 2004, Pahl-Wostl et al., 2011). This was evident in many countries, especially sub-Saharan Africa (SSA), where governments established large and centrally managed water programmes (Lane, 2006, Giné and Pérez-Foguet, 2008, Opare, 2011). Several reasons, including political and socio-economic, have been attributed to state dominance in the water sector (Saleth and Dinar, 2004, Davis et al., 1995, Mohan, 2008, WHO, 1996) (see section 2.2 for details).

Additionally, prior to the 1960s, water was perceived as a public good and governments sought to cover the cost of its services (Cleaver and Toner, 2006, Schouten and Moriarty, 2003). As such, there was a culture of “free water for all”, whereby governments were actively providing water to communities regardless of community needs and priorities (McCommon et al., 1990, Giné and Pérez-Foguet, 2008). This was the era of supply-driven approach to water delivery,

and the sector relied heavily on technocratic/engineering solutions which resulted in infrastructure that sometimes was beyond the beneficiaries' capability to maintain (Lane, 2006, WHO, 1996, Yu, 2014). Besides the technical focus of water delivery, centralised management was also characterised by corruption, was uncoordinated, and lacked a capacity-building component. Other characteristics of centralised water management include: institutional inefficiency; water loss; unproductive political interference; and financial inefficiency (Biswas and Tortajada, 2010, Jiménez and Pérez-Foguet, 2010, Tortajada, 2010b, McCommon et al., 1990, Ostrom et al., 1993).

Concurrently, the high recurrent cost, coupled with macro-economic constraints and diminishing state financing in many countries, especially SSA (where budgets could not sustainably finance the cost of operation), led to water supply facility failures (see Jaglin, 2002, Evans and Appleton, 1993, Cleaver and Toner, 2006, Harvey and Reed, 2006b, Jiménez and Pérez-Foguet, 2010). The ailing water sector created a blame-game among its actors. The engineers were blamed for poor quality construction. The communities were blamed for lack of community participation. The governing bodies were blamed for poor governance and poor pricing or tariff design (Whittington et al., 2009, Schouten and Moriarty, 2003). Social scientists argue that the engineers ignored the internal community dynamics and, as such, blamed them for lack of insight into community issues. Engineers in turn blamed the social scientists for lack of basic knowledge of water infrastructure (Schouten and Moriarty, 2003).

This blame-game revealed two considerations for this study; (i) the water sector comprises a multi-disciplinary "problem"; and (ii) all disciplines recognise that the supply-driven approach has sustainability challenges, although *analysis* of the water sector has rarely been conducted with a multi-disciplinary perspective. The water sector has been viewed narrowly, without drawing critical linkages between water and other dimensions of communities, such as their livelihood, community level social capital and, the social and cultural value that they attach to water (Schouten and Moriarty, 2003, Saleth and Dinar, 2004). It is also argued that the approach did not take into account the social and institutional dynamics that are inherent in communities (Pahl-Wostl et al., 2011, Armitage, 2005, Cleaver and Toner, 2006). This narrow perspective which characterised the supply driven approach (centralised) was not sustainable (Schouten and Moriarty, 2003, Saleth and Dinar, 2004).

Thus, scholars and practitioners advocated participation that allowed people to express their needs, and give agencies (outsiders) the opportunity to understand local needs (Narayan, 1995, Mohan, 2008, Brett, 2003). Concurrently, while calls were made to decentralise and promote participation in water management, the neo-liberal agenda of the 1980s that characterised policy and institutional reforms *reduced* the role of government in service

delivery (Lane, 2006). For example, the structural adjustment programme made governments, especially in SSA, reduce their role through privatisation and de-regulation and rather encourage partnership among stakeholders (Brett, 2003, Jaglin, 2002, Lane, 2006). In short, political and socio-economic transformation favoured reforms in the water sector (Lane, 2006).

1.2.1 Policy shifts in water management and the outcomes

From the preceding section, it is evident that water management was shifting from a purely command and control approach, where decisions and actions were centralised, to a decentralised approach. Pahl-Wostl et al. (2011) further argued that the shift was necessary because a centralised approach to water management could not handle complex adaptive systems[2] (CAS), such as water systems. They added that managing such water systems requires flexibility and a set of rules that are deemed appropriate to steer the water systems to achieve certain goals, which are not externally defined (Pahl-Wostl et al., 2011). Therefore, rather than blaming the various actors, as demonstrated above, it is argued that failures in water management should focus on a mismatch between existing management practices and the institutional arrangements on the one hand, and between community dynamics[3] and programme design/implementation on the other (see, for example, Schouten and Moriarty, 2003, Pahl-Wostl et al., 2011, Harvey and Reed, 2004, Bettini and Brown, 2011).

The challenges that characterised the centralised approach, presence of community dynamics, and the need for flexibility and appropriate rules partly laid the foundation for theorising decentralisation as an antidote to centralised systems of governance. Within the policy arena and the academic world, decentralisation was hailed as an approach: (i) that promotes participation and (ii) through which local governments can better administer policies because they are closest to the people and familiar with their needs (Andersson and Ostrom, 2008, Meynen and Doornbos, 2004, Conyers, 1981). These arguments are based on the assumption that "local level decision makers have access to better information on local circumstances; consumers provide input to the decision-making process and hold decision makers accountable; the autonomy to administer water services creates opportunity for learning; and that there is user participation and adaptation of water service to local circumstances" (Mugabi and Njiru, 2006:189). It can be argued that the benefits of decentralising water management will be achieved if these assumptions hold.

To give impetus to the call for decentralisation in the sector as a way of improving service delivery and to solve the sector problems, the United Nations held a water conference in Mar

[2] Complex adaptive systems are made up of many components which are connected in various ways and interacting according to a set of rules of behaviour/operations within a changing/dynamic environment. Examples of such systems include irrigation systems and piped water systems in communities.

[3] Community dynamics suggest that communities are active and contain different interest groups, and community structures change in terms of power balances, wealth and resource endowment, population size and gender inequality (Schouten and Moriarty, 2003).

Plata, Argentina in 1977: it was resolved that the decade 1981 to 1990 would be declared the International Drinking Water Supply and Sanitation Decade (IDWSD). Within the water component of the declaration, the goal was to provide access to safe water across the world and all member states were required to pursue this goal. Among its recommended strategies was community participation in water services delivery (United Nations, 1990). Consequently, decentralised water management was regarded as the best option to offset the challenges of the water sector and contribute to improved performance outcomes (see, for example, Yu et al., 2012, McCommon et al., 1990, Asthana, 2012, Evans and Appleton, 1993).

The 1980s therefore marked a transitional period in the water sector, that is, moving from the traditionally centralised to a new, decentralised, approach (Sara and Katz, 1997). This policy shift was emphasised in various international conferences such as the 1992 Dublin statement, Chapter 18 of Agenda 21 from Rio de Janeiro in 1992 (Eguavoen and Youkhana, 2008). The outcome of these conferences further widened the acceptance of the critical role of local people by various governments and development practitioners across the various sectors of their economies, especially in water services delivery. The water sector shifted towards a bottom-up and decentralised approach to water services delivery, with governments and donors committing resources to the supply of water facilities (Eguavoen and Youkhana, 2008, Lane, 2006, United Nations, 1990), resulting in an increase in water facilities.

It was observed that although many facilities were constructed during the IDWSD, over concentration on capital investments overshadowed government support for operation and maintenance. As such, at any given time, 40-60% of the facilities were not functioning (WHO, 1996). Specifically in Ghana, by the late 1980s and early 1990s, 33% of the water supply systems had deteriorated greatly or completely broken down due to inadequate funding to carry out maintenance and rehabilitation (MWRWH, 2009). These challenges showed that there were still gaps in the reforms.

From community participation to management: Although the approach to water supply shifted attention to community participation, unfortunately, in most cases, tokenism is a major problem of participation, where some agencies use the rhetoric of participation with limited empowerment (Harvey and Reed, 2004, Mohan, 2008, Doe and Khan, 2004). Besides tokenism, homogeneity is over simplified, where projects tend to normalize communities by pretending that the conditions are the same everywhere, whereas in reality community dynamics are diverse (Schouten and Moriarty, 2003). Hence, it was apparent that participation in water projects was not optimal. For example, it was established that community participation in the sector was restricted to mobilization of self-help labour, or the organization of local

groups to ratify decisions made by project planners outside the community (Laryea, 1994, Schouten and Moriarty, 2003).

It was realised that sustainable water delivery cannot be achieved by means of communal labour without actively involving the users in planning and management. Ordinary community participation that was being implemented failed to address problems of accountability and underutilisation of resources at the community level (WHO, 1996, Schouten and Moriarty, 2003). Similarly, Cleaver (1999) stressed that in development projects, there is a translation of participation into a managerial exercise based on “toolboxes” of procedures and techniques. Without some level of *institutionalised* accountability, participation is meaningless: that is, participation needs to be operationalized via an institutional arrangement that maximises the accountability of agencies at the community level (Brett, 2003). It was further argued that participatory efforts have not effectively addressed the challenge of adaptation to local dynamics and the priorities of different groups, although these must be addressed to solve sustainability challenges (see Wendy and Bakalian, 2009, Mehta, 2007).

A move from community participation to community management was subsequently proposed (WHO, 1996, McCommon et al., 1990). Community management is a bottom-up approach in which members of a community assume *responsibility, authority* and *control* over the development and management of their water systems (McCommon et al., 1990, Doe and Khan, 2004). It builds on the strengths and weaknesses of community participation and moves a step ahead and “equips communities to take charge of their own water supply improvements” (Evans and Appleton, 1993:4). Community management became the “buzzword” in the policy arenas (Christina et al., 2013) for rural and small town water sectors in developing countries.

Community management is often promoted because of its theoretically justified benefits: that communities are able to equitably, efficiently and sustainably manage resources because of their strong social structure, common interest and defined geographical boundaries and responsibilities (see, for example, Blaikie, 2006, Isham and Kähkönen, 2002b, Moriarty et al., 2013). It is assumed that community members know themselves and are able to design rules that are suitable to local situations (adaptive rules) (Ostrom, 2005). That is, community-level crafted rules promote trust within the community and reduce the cost of enforcement (Andersson and Ostrom, 2008, Ostrom, 2005). Community management is also based on the assumption that communities and community-based organisations are close to the water resources and are in a better position to adopt effective management approaches to resource use (Armitage, 2005, Schouten and Moriarty, 2003, Andersson and Ostrom, 2008).

Consequently, the approach has received international endorsement and has been championed by donors, sometimes, as a condition for investment in the water sector (Asthana, 2012, Fuest, 2006). For instance, in terms of sustainable water delivery, a guiding principle for achieving Agenda 21 is: "community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes" (Evans and Appleton, 1993:7). However, as many countries shifted to decentralised community-based management approach in the water sector, studies show that decentralisation, and for that matter management that is closer to the people, does not necessarily translate into efficient water supply (see Asthana, 2012, Moriarty et al., 2013, Doe and Khan, 2004, Harvey and Reed, 2006a). The implementation of CBWM approach has had mixed outcomes.

Outcomes: The implementation of CBWM has contributed to improved access to water, with global access increasing from 62% in 1990 to 82% in 2012 (UNICEF and WHO, 2014). Specifically, increases in access to water have been recorded in countries, including Bolivia, Peru, Ghana, and Costa Rica (see Whittington et al., 2009, Opare, 2011, Madrigal et al., 2011). For instance, in Ghana, access in rural and small towns increased from 27% in 1990 to 63.7% in 2013 (CWSA, 2014b). In Ghana, Opare (2011:1035) established that the water systems functioned effectively after "seven years of the withdrawal of direct and significant external management support and replacement with full community management", concluding that this was a significant achievement, although the assessment was based on the performance outcomes. Using performance outcomes to draw conclusions is supported by other researchers. For example, according to Asthana (2012), a decentralised water supply can also be justified by its expected performance outcomes. Going by such an argument, the statistics show that the CBWM approach is justifiable because it has improved access to water services. However, analysis of decentralised CBWM needs to go beyond the nominal performance statistics to explore *how* the outcomes are derived and *how* the benefits from the outcomes are distributed.

Despite these statistical gains, there are persistent dynamics within the sector that should not be overlooked. For example, the facilitation role of government within CBWM is characterised by bureaucratic and institutional rigidity in structures, staffing, rules and procedures (Carter et al., 1999, Meinzen-Dick, 2007, Harvey and Reed, 2004), which stifle community-based management. For instance, despite the implementation of CBWM, about a third of water facilities in SSA were non-functional (Jiménez and Pérez-Foguet, 2010, Harvey and Reed, 2006b). A panel of experts in the water sector at an international workshop on water governance noted that notwithstanding the reforms that have characterised the sector, progress towards better results in the sector has been slow and often filled with uncertainty,

partly due to “fragmented institutional arrangements and conflicting decision-making structures” (Tortajada, 2010b:300). They argue that despite the relevance of management functions and reporting, it remains largely unclear what actors have the authority to execute it (Tortajada, 2010b). It is further argued that the problems of functionality are the outcome of the political economy of the sector, which favours financing of new projects over the maintenance of existing water systems (Moriarty et al., 2013).

Moriarty et al. (2013) recognised that the statistics from the WHO and UNICEF joint monitoring team indicate that the Millennium Development Goal target on water was met five years ahead of the target date yet there were reported cases of high non-functionality of the water systems. This implies that despite the statistical increase in access to water services, ensuring that the water services continue to function remains a challenge for CBWM. Therefore, there are other grey areas since the evolution of CBWM which require careful framing and investigation.

1.3 Framing and contextualising the research problem

Given the mixed outcomes of the implementation of a CBWM approach, it is important to unravel certain implicit factors behind the outcomes. Studies have shown that despite the wider application of CBWM, it is constrained by household poverty, human resource weakness, and urbanisation of some localities (see Laryea, 1994, Carter et al., 1999, Opare, 2011, Wendy and Bakalian, 2009, Rouse, 2013). In fact, these factors are postulated to run far into the future. For instance, financial soundness recently has been advanced as a key determinant of the ability of the water systems to respond to breakdowns (Giné and Pérez-Foguet, 2008, Saleth and Dinar, 2004, Opare, 2011, Schouten and Moriarty, 2003). In that respect, North-western Ghana (Upper West Region), which has the highest poverty incidence (70.7%) (Ghana Statistics Service, 2014), could face financial sustainability challenges since CBWM relies on customer payment for water services (water revenue) to finance its activities.

In Ghana, there has been a consistent increase in urbanisation. The proportion of the urban population (localities with at least 5,000 people) increased from 23.1% in 1960 to 32.0% in 1984, 43.8% in 2000 and 50.9% in 2010 (Ghana Statistical Service, 2013a). Due to the increasing trend in urbanisation, there is a need to redirect efforts towards small towns (localities in the process of urbanising) because it is argued that improved access to water in small towns can contribute to meeting the MDGs (World Bank, 2009). Consequently, since the 1990s there has been much investment in the water sector in small towns in Ghana with the aim of increasing access to water (World Bank, 2010, World Bank, 2009). However, experience in developing countries suggests that sustainable water supply does not depend on additional water resources, but on appropriate management practices (Rouse, 2013), raising questions about the institutional arrangements for managing water systems.

Although small towns and rural communities have been subjected to CBWM (see CWSA, 2007a, Mugabi and Njiru, 2006, Moriarty et al., 2002), there is little research on water management in growing regions (small towns) (see Mugabi and Njiru, 2006, Tortajada, 2010a). Moreover, it is advanced that community dynamics are significant in small towns (United Nations, 2002, Schouten and Moriarty, 2003), yet such dynamics are often ignored in arguing for community-based management (Blaikie, 2006). It is also argued that CBWM is appropriate when it operates at a small-scale[4], where collective action is appropriate. CBWM is not appropriate at a larger scale because increasing population reduces community cohesion and, as such, reduces the relevance of CBWM in such areas (Moriarty et al., 2013, Harvey and Reed, 2006a, Manyena et al., 2008, Moriarty et al., 2002, Schouten and Moriarty, 2003, Doe and Khan, 2004, Blaikie, 2006, Meinzen-Dick, 2007). It is argued further that small towns are too small to attract large private utilities to take over their water management (Moriarty et al., 2002, Mugabi and Njiru, 2006). These arguments create uncertainty about the appropriate water management approach in small towns, although the World Bank promotes CBWM in small towns and rural areas in Ghana with the argument that it is a *shared responsibility* (Gbedemah, 2010).

As part of the CBWM approach, communities are required to contribute towards the capital cost and it is argued that this will inculcate a sense of ownership and to indicate the community's ability to maintain the water system (Harvey, 2007, Falk et al., 2009), making CBWM a shared responsibility. This argument suggests that CBWM is not entirely voluntary. It also implies that the approach is an evolving partnership between communities and other actors, especially the state (Opare, 2011, Evans and Appleton, 1993, Falk et al., 2009, Imperial and Yandle, 2005), suggesting a nested institutional arrangement: that is, a normative CBWM comprises a well-functioning chain of actors (Madrigal et al 2011). Ostrom argues for a nesting of community actors with state structures because state structures can facilitate efficiency at the community level (Mansbridge, 2014, Ostrom et al., 1993). Such an argument requires further investigation to examine the extent to which such a nested arrangement of institutions supports effective CBWM. While such a deeper examination of the institutional arrangements of resource systems is significant, it remains a key knowledge gap (Bettini and Brown, 2011, Clement, 2010), suggesting that recent calls for a deeper understanding of multi-level institutions, using an appropriate framework of analysis, (see Yu, 2014, Huitema et al., 2009, Andersson and Ostrom, 2008, McGinnis and Ostrom, 2014, Clement, 2010) are justified.

Without a deeper institutional perspective of CBWM, a cursory assessment of the performance alone can result in inconclusive prescriptions. Some scholars argue that communities have limited financial capacity, low professionalism and that there is poor relationship between users

[4] Doe and Khan (2004) argue that CBWM is appropriate for settlements with population less than 3,000 people

and community management bodies and, as such, they cannot manage the water systems *without* external support[5] (Moriarty et al., 2013, Lane, 2006, Schouten and Moriarty, 2003, Jiménez and Pérez-Foguet, 2010, Giné and Pérez-Foguet, 2008, Harvey and Reed, 2006a). Despite the relevance of these arguments, Moglia et al. (2011) posit that in a decentralised resource management, understanding where failures start within the management process and how they spread with management is critical. This implies that there are sometimes methodological gaps in the research. That is, many researchers focus and "count the outcomes of institutional processes", but fail to examine the role that institutions play in creating the outcomes (Suddaby, 2010:16). Similarly, Biswas and Tortajada (2010:171) argued that many of the reasons given for poor performance of the water sector, such as "inability of the poor to pay and lack of expertise", are mere excuses for the fundamental reason: that is, governance and leadership challenges.

The above discussion demonstrates that while there has been much focus on CBWM, it remains underexplored. Less attention has been given to the networks of actors and their interactions, where the actions or inactions of one actor can have ripple effects on CBWM. Likewise, Clement (2010) indicated that in decentralised resource management, examining the gaps between rhetoric and actual outcomes requires an analysis of multiple levels. Therefore, filling these gaps requires subjecting the CBWM into an impartial institutional arrangements and performance linkage analysis.

1.3.1 The research focus and questions

The preceding sections demonstrate that it is necessary to apply an appropriate analytical framework that would critically and holistically examine CBWM in small towns. Therefore, this study uses the institutional analysis and development (IAD) framework to examine the institutional arrangements for CBWM in small towns. This entails analysing the actors, their responsibilities and the resources, including authority, available to them (Ingram et al., 1984). However, subjecting CBWM to institutional analysis alone can *also* result in inconclusiveness if an analysis of the performance status is not carried out concurrently. In order to understand the significance of institutions in CBWM, it is imperative to analyse the existing performance. This is further justified because in North-western Ghana, for example, the annual reports of the Regional CWSA, based on a cursory assessment, indicate that some of the community-based managed small town water systems are performing better than others (CWSA UWR, 2012). However**,** there were no details about the nature and the rationale behind the differences in performance. Hence, it is important to understand why some water systems,

[5] Wendy and Bakalian (2009) refer to it as post-construction support. Based on a review of scholarly works, Smits et al (2013:386) categorised external support into the following: (i) monitoring, including water-quality testing and auditing; (ii) technical advice in aspects of operation and maintenance and administration; (iii) conflict resolution and moderating between different groups in the community; (iv) support in identifying capital maintenance needs and resource mobilisation for such works; (v) monetary or material support is normally not considered as part of the support functions. It may entail identifying possible funding sources and development of funding proposals; (vi) (Re)training and refresher courses for service providers; and (vii) provision of information materials, such as manuals, guidelines and other informative material.

subjected to similar conditions within a given geographical and socio-economic environment, do better than others.

Therefore, this study examines the performance of the water systems and the extent to which the performance is influenced by the institutional arrangements and management practices. Such a dualistic analysis will help better situate CBWM within its theoretical argument. Specifically, this study seeks to answer the following questions (see Table 1.1 below).

Table 1.1 Research questions and sub-questions

Main questions	Sub-questions
What is the existing performance of the water systems in small towns in North-western Ghana?	i. What is the financial performance of the water systems in terms of revenue generation and administration in relation to expenses? ii. What is the current state of water and revenue loss? iii. What is the customer satisfaction level of water services (reliability, quality and pressure of flow)? iv. How satisfied are customers with the operations of water management staff? v. How accountable and transparent are actors in water management? vi. Do users participate in decision-making about the management of the water systems?
What are the institutional arrangements for community-based water management?	i. Who are the main actors in small town water management? ii. How are the structures constituted at the community levels? iii. Are the roles and responsibilities of actors consistent and clearly stated? iv. What is the gender dimension of water management? v. What rules exist for governing the management of small town water systems, and are they adhered to? vi. What is the institutionalised process of accessing water from the public stand-posts and/or private subscription? vii. Who owns and controls the water systems in small towns?
How do the institutional arrangements and the existing practices of CBWM influence the performance of the water systems?	i. Does the institutional arrangement create room for accountability, participatory decision-making and information sharing in water management? ii. What are the core factors that drive CBWM in small towns? iii. Given the current state of the water systems, is community-based management appropriate in these small towns?

Source: Author's construct, 2014.

1.4 Scope, limitations of the research, and structure of the thesis

Scope: Within the context of water management there are three main kinds of CBWM regimes in Ghana: (i) "local management of facilities, which are not considered by the National Community Water and Sanitation Programme (NCWSP) and these water sources include streams and shallow wells; (ii) local management of hand pumps under NCWSP; and (iii) local management of small town water systems under NCWSP" (Eguavoen, 2007:289). This study focuses on local *management* of small town water systems under the NCWSP and, as such, the analysis focuses on actors that are *directly* involved in CBWM: the regulatory and the operational levels. This is because the argument in section 1.3 above has been largely on direct community-based water management. Therefore, four cases of small town water systems (Gwollu, Daffiama, Busa and Babile) have been selected in North-western Ghana for

the study. The research questions were addressed using mixed methods. The first research question (see Table 1.1) was addressed using quantitative data from household survey, data series from the community level water organisations and triangulated with qualitative data. The second research question was addressed mainly using qualitative data. The third question emanates from the analysis of the first two questions and it seeks to analyse how the institutional arrangements for CBWM influence performance outcomes. Consequently, it also analyses CBWM within the wider theoretical arguments of community-based natural resource management, which led to the adoption of CBWM as a preferred approach to water services delivery.

Limitations: This study is limited to water systems that are *directly* managed by community members through elected/selected representatives and did not include delegated management. Additionally, the water systems have technical components, such as the technical design and quality of spare parts, which affect the functioning of the water systems. However, this study did not delve into a rigorous assessment of the technical components of the water systems. Finally, the lack of data series on some indicators such as water production, water consumption, revenue and expenditure in some communities has made it difficult to explicitly evaluate such indicators.

Structure of thesis: The rest of the thesis is structured into seven chapters. Chapter two presents a literature review on decentralisation of resource management. It builds on section 1.2 above to examine the foundation of CBWM, the core arguments and the entrenched concepts in CBWM, and the implementation experiences of different countries. Chapter three explains the factors that shape CBWM. Based on the drivers of CBWM, the chapter discusses polycentricity and its significance in CBWM, pointing out the role of the state within a decentralised system of resource management. The chapter concludes by pointing out the need for a theoretical framework to critically examine CBWM in small towns. Chapter four focuses on the theoretical and analytical framework for analysing CBWM in small towns, with particular reference to the IAD framework. Chapter five is divided into two main sections. The first section presents the methodology used in this study. It indicates the research design, the data collection and the data analysis techniques of the study. The second section presents an overview of Ghana, with emphasis on the water sector and the four case study areas.

Chapters six and seven focus on the data analysis. Chapter six analyses the performance of the water systems in terms of: (i) access to water and equity (ii) financial and technical efficiency (iii) knowledge and information sharing on water management; (iv) user satisfaction with water services and management activities; (v) community level governance (participatory decision-making, accountability and transparency) and, ownership and control over the water

systems. Chapter seven presents an analysis of the declared institutional arrangements and existing operation and maintenance practices that are used in CBWM in small towns. Chapter eight presents the discussions and conclusion on CBWM. It seeks to examine the extent to which the field results are situated within the available literature, the wider theory on CBWM, and to draw out the appropriateness of CBWM in small towns. This chapter points out the research contributions and finally draws conclusions on CBWM in small towns and the implications, including directions for future research.

2 Decentralisation and water management

2.1 Introduction

This chapter presents a literature review. The purpose of this chapter is to critically review literature on community-based water management (CBWM). It examines the basis of CBWM, the concepts embedded in CBWM, the core arguments of CBWM and its tenets, and experiences of different countries that have used the CBWM approach to water services delivery. The chapter is divided into four main sections. The first section presents an overview of the rationale and the challenges of state dominance in services delivery. The second section focuses on a review of decentralisation of resource management with particular emphasis on decentralised water management. Section three delves into the details of the CBWM approach and its core tenets. Section four analyses the outcomes (successes and challenges) of decentralised water management.

2.2 Centralised services delivery

Many developing countries, particularly in sub-Saharan Africa (SSA), after independence remained centrally regulated for several reasons. First, centralisation as a practice can be attributed to the legacy of the practice of their colonial masters, which governments, after attaining independence, viewed as the right path to follow. Second, governments widely believed that economic decentralisation would benefit the few and have adverse effects on larger sections of the population. Additionally, governments in SSA, immediately after independence in the 1960s, were devoted to nation-building and required substantial investment in programmes for economic development and realised such an objective required a centralised approach (Rondinelli et al., 1983). The assumption was that centralised provision of services will benefit from economies of scale in production, limit free-riding among actors in the process of service provision, and make the best use of the available scientific knowledge (technical expertise). In terms of resource mobilisation, advocates of centralisation posit that it allows governments to have greater control over the fiscal aspect of the economy (see Ostrom et al., 1993).

The water services, especially to rural areas and small towns, were delivered through a centralised approach and several reasons were advanced for governments' absolute involvement in the development and management of water services. From a multi-sectoral perspective, Sara and Katz (1997) observed that governments opted to bear the full cost of water delivery because they assumed that improved access to water would have positive consequences on health, increasing productivity in rural communities. Besides the ripple effects of improved access to water on other sectors, Lockwood (2004) argues that when international donors delivered new water infrastructure, it was the elite minority who could afford the services. This has required that governments in such countries provide water for

those unable to pay. In line with this argument, Saleth and Dinar (2004) advanced that the historical role of the water sector should not be overlooked in any discussion about the evolution of water supply in developing countries. In retrospect, the supply-driven approach has contributed to agricultural development and improved quality of life in emerging countries in Africa and Asia. However, the rate of population growth that has outpaced government resources, as well as the mismanagement of water projects have reduced its relevance (Saleth and Dinar, 2004).

As nations pursued this centrally controlled development approach, several challenges, including budgetary constraints and mismatches between development programmes and local level conditions, emerged (Rondinelli et al., 1989). Similarly, following an analysis of centralised provisions of services, Ostrom and her colleagues identified shortcomings. Accordingly, centralised institutional arrangements for service provision create opportunities for (i) corruption, especially during construction, operation and maintenance phases and (ii) illegal sub-payments to those involved in construction in order to divert funds for private benefits (Ostrom et al., 1993). For example, globally, the unit cost of improving rural water supply increased by 24% between 1980 and 1985 (McCommon et al., 1990), putting a stress on governments budgets. Within the same period, the Government of Ghana support to state-owned enterprises rose from ¢1.1 to ¢7.35 billion (Opare, 2011). Similarly, government "free basic water policy" in South Africa, where government funded all capital and operation and maintenance costs, has had financing operation and maintenance challenges, worsened by unnecessary bureaucratic procedures (Harvey and Reed, 2004:47). Nauges and Whittington (2010) observed that besides the cost to governments, the supply-driven approach has resulted in governments and donors investing money in projects that were later abandoned, simply because households did not want them. In their view, "communities did not have a sense of ownership" (Nauges and Whittington, 2010:266).

The challenges with the centralised, supply-driven, approach paved the way for the consensual argument that it did not ensure effective water delivery, and the stakeholders called for water planning, based on scientific principles and a good understanding of local cultural priorities (bottom-up) (see Jaglin, 2002, Davis et al., 1995, Evans and Appleton, 1993, Hindmarsh, 2012). This led to another approach to service delivery, a decentralised provision of services that later became characteristic of many developing countries.

2.3 Decentralised services delivery

As demonstrated in the previous chapter the foundation of a CBWM approach is within the system of decentralised provision and management of services. Decentralisation advocates maintained that local authorities are less corrupt, more accountable and more likely to improve

rural service delivery than the centralised state (see Ezeanyika et al., 2010, Blaikie, 2006, Isham and Kähkönen, 2002b). The 2004 World Bank Report substantiates the rethinking of the service delivery approach in developing countries as follows;

> *"Too often, services fail poor people – in access, in quantity, in quality. But the fact that there are strong examples where services do work means governments and citizens can do better. How? By putting poor people at the centre of service provision: by enabling them to monitor and discipline service providers, by amplifying their voice in policymaking, and by strengthening the incentives for providers to serve the poor" (Bardhan and Mookherjee, 2006:101).*

That is, the problem of accountability that characterised the centralised approach can be eliminated to give greater control rights to local people (Bardhan and Mookherjee, 2006). Confidence rested on the local level to propel development, and consequently decentralisation emerged as a form of improving development administration, including community-based natural resource management (Conyers, 1981, Blaikie, 2006).

Independent states finally welcomed decentralisation because they wanted to show their desire to achieve democracy and meet local needs (Conyers, 1983, Crook, 1994). Although countries embraced the concept, it has different meanings to different disciplines, and it is prominent with economists and political scientists. Political scientists focus on governmental processes (diversification in services delivery and how citizens can influence the process) while economists emphasise economic efficiency (cost minimisation), arguing that centralisation increases costs of transaction (Conyers, 1984, Jütting et al., 2004, Imperial, 1999).

Consequently, resource management, especially water, has been associated with decentralisation and the strong encouragement of public participation in democratic decision-making (Harvey and Reed, 2004, Doe and Khan, 2004, Herrfahrdt-Pähle, 2014). More importantly, it has been argued that, although centralised water management ensures rapid decision-making or effective coordination of resources, it has limited capacity to solve complex problems. Hence, decentralised water management is advocated as having the benefits of drawing expertise from various stakeholders to handle complex problems (Rijke et al., 2013, Pahl-Wostl et al., 2011). As stated earlier, the different disciplines and context of usage has given decentralisation varied interpretations, with changing scope over time (Christina et al., 2013).

Many writers have explained decentralisation in terms of transfer of authority and functions from central to local levels. That is, decentralisation is the transfer of responsibility for planning, management, resource mobilisation and allocation from central government ministries and agencies to: (i) lower levels/field units of central government ministries and agencies (deconcentration); (ii) organisations that are outside the regular bureaucratic structure and that

are only indirectly controlled by the central government, 'semi-autonomous' authorities (delegation); (iii) subordinate levels of government (devolution); and (iv) the private sector, independent of the government (privatisation) (Kokor and Kroes, 2000, Gilbert et al., 2013, Conyers, 1981, Conyers, 1984, Rondinelli, 1980, Rondinelli et al., 1983, Rondinelli, 1991).

Delving into these explanations, a number of issues emerge. It presumes that functions and authorities were first held by the centre (centralised) and subsequently decentralised. It also indicates that there are different types of decentralisation (varying degrees to which services are decentralised or responsibilities are transferred), ranging from semi-centralised to fully-fledged decentralisation (full autonomy). Table 2.1 presents an explanation of the types of decentralisation.

Table 2.1 Types of decentralisation

Type	Description
Deconcentration	Transfer of some amount of administrative authority or responsibility to lower levels within central government ministries and agencies, such as regional, provincial and district. Deconcentrated offices work with hierarchy, such as line ministries and are under the supervision of such ministries.
Devolution	The creation and strengthening of subnational units of government, the activities of which are substantially outside the direct control of the central government. That is, the units are autonomous and independent, and their legal status makes them separate or distinct from the central government. They are responsible for formulation, implementation and financing of policies.
Delegation	Transfer of managerial responsibility for specific functions to organisations that are outside the regular bureaucratic structures and that are only indirectly controlled by the central government. This is basically a principal-agency relationship, whereby the central government is the principal and the organisation is the executing agency in compliance with the "contract". The organisation is accountable to the central government.
Privatisation	Transfer of certain public sector functions/responsibilities, such as provision and management of services, to the private sector, independent of the government.

Source: constructed from Rondinelli et al. (1983); Kokor and Kroes (2000);

Since functions and powers are transferred to local levels, choice of the type of decentralisation to be applied needs to be guided by: (i) the characteristics at the local level; (ii) the financial implications vis-à-vis the alternative forms of service delivery; and (iii) a critical analysis of the general pros and cons of decentralising a particular service (Rondinelli et al., 1989). These factors notwithstanding, the conceptualisation of decentralisation and the intentions of many states and the advocates of international organisations are to have devolutionary type of decentralisation (Asthana, 2012, Kokor and Kroes, 2000). This is to promote transparency in decision-making and implementation at the local levels. The desire for devolution is also due to the argument that local level actors can best handle differences in local level conditions (Asthana, 2012). However, many states actually practiced deconcentration as opposed to

devolution (Awortwi, 2011, Conyers, 1984), which is an indication of a mismatch between intention (decentralisation policy) and actual implementation (practice on the ground).

In practical terms, the manner and extent to which power and functions are transferred signify different forms of decentralisation. Three major forms of decentralisation have been identified: political, administrative and fiscal (see Kokor and Kroes, 2000, Antwi-Boasiako, 2010, Litvack and Seddon, 1999, Dauti, 2015). Political decentralisation focuses on giving people and their representatives decision-making power. It is based on the premise that selecting local representatives onto decision-making platforms will ensure better informed decisions that represent the diverse sections of society. Administrative and fiscal decentralisation seeks to shed authority, responsibility and autonomy of financial resource mobilisation and management to the local levels (Christina et al., 2013, Litvack and Seddon, 1999, Dauti, 2015). These forms of decentralisation provide a strong entry point for analysis of community-based management of water systems. For instance, Christina and her colleagues linked the forms of decentralisation and CBWM because community level management bodies are elected to represent their constituents in decision-making; and the transfer of management functions and resource mobilisation functions to community level structures requires administrative and financial activities (Christina et al., 2013).

2.3.1 Decentralisation and water management nexus

The types of decentralisation have different manifestations in water management, with both positive and negative consequences on resources and end users. For Smoke (2003), the debate for or against decentralisation is based on who will benefit or suffer thereof. While my studies acknowledge the shortfalls and strengths of decentralisation, the intention is not to delve into analysing the pros and cons of each type, but to draw a link between decentralisation and water sector management. It is widely expected that local governments are in close contact with the communities and, as such, the local government and the communities understand local conditions and will be in a better position to manage water services that correspond with communities' preferences (Mugabi and Njiru, 2006, De, 2009, Larson and Soto, 2008). Therefore, in line with the types of decentralisation presented above, different management models of water have emerged, all aimed at delivering efficient services. Four models have been identified, namely: (i) community management; (ii) municipal management; (iii) delegated management; and (iv) private ownership and management (Moriarty et al., 2002, Valfrey-Visser, 2008, Eguavoen, 2008). As indicated in Table 2.2, these water management models have different management characteristics.

Table 2.2 Water management models

Management models / Management Characteristics	Community Management		Municipal Management	Delegated Management	Privately owned & operated
	Small Towns	Rural (villages)			
Facility type	Piped system (usually, mechanised boreholes with reservoir and distribution networks).	Borehole with hand pumps, hand dug well, with or without hand pump.	Piped systems (surface water with treatment plants or mechanised boreholes with reservoir).	Piped system (similar to small town and/or municipal management).	Borehole with hand pump or piped system.
Ownership	Community (sense of ownership).	Community (sense of ownership).	Local government.	Local government or the community.	Private.
Management (operation & maintenance)	By community, mostly through its structures, or delegated to a third party.	Entirely by the community.	By government through its decentralised units.	Mostly, the third party is responsible for operation and maintenance.	Management autonomy of water provider is absolute in this case.
Regulation	Left to the community and its structures, and the local government, especially in regulating tariff setting.	Left to the community and its structures with minimal local government regulation.	Local government or an independent regulator within national policy framework.	Local government or an independent regulator within national policy framework.	Local government, but self-funded providers usually escape formal regulation, sometimes to the detriment of users.
Transparency and accountability	Water boards are transparent / accountable when their leaders decide to be so or when users and local government keep them under pressure.	Water committees are transparent / accountable when their leaders decide to be so, or when users keep them under pressure.	Utility agencies are responsible but budgetary and political issues at times make municipal services poorly transparent and accountable.	Due to the existence of a contract, providers are accountable to the delegating authorities and obliged to ensure transparency.	Providers are only accountable to themselves, unless the institutional framework obliges them to be accountable to a body/an authority.
Monitoring	Community and local government level structures.	Community and local government level structures.	Various branches of government.	Monitoring remains largely with local government.	Private and sometimes water quality is monitored by government agencies.

Source: Constructed from (Moriarty et al., 2002, Eguavoen, 2008, Valfrey-Visser, 2008)

Within the context of decentralised water services delivery, two important levels of devolution have emerged: devolution to local governments and devolution to community-based user groups (Litvack and Seddon, 1999). Small-scale irrigation, rural, small towns and urban water supply are devolved to local governments to perform functions such as planning and implementation of projects, provision of technical advice to communities and monitoring (Litvack and Seddon, 1999). The desire for user involvement in planning, implementation and management of water services has led to decentralising water supply to communities through community-based water management (CBWM). As shown in Table 2.2, CBWM (the first model in the table) can best be described as “devolution”, because the essence of devolution is a discretionary authority (Kokor and Kroes, 2000), and CBWM in principle gives discretionary authority over the water system to the community (McCommon et al., 1990, Karikari, 1996, Doe and Khan, 2004).

Delegated management also can be tied to privatisation. However, because of the varied views on privatisation (see, for example, Prasad, 2006, Bakker, 2007, Rees, 1998), it is important to distinguish between privatisation and delegated management of water services. Complete privatisation entails transfer of infrastructure and management responsibilities to the private sector (Isabelle, 1999). This is a component of model four (category 4 in Table 2.2), which also could mean that the facility was constructed, legally owned and managed by a private operator (Valfrey-Visser, 2008), and its water services are either used privately or delivered to the public at a fee in most cases.

In contrast, with delegated management model (category 3 in Table 2.2), the municipal or the public sector continues to own the water facility (distribution system) but gives authority for operation and maintenance to the private sector (Moriarty et al., 2002). In simple terms, it is a public-private partnership, where there is a contractual agreement between the two parties who virtually have a shared mutual objectives and perhaps a working arrangement (Bardhan and Mookherjee, 2005). Delegated management often emerges or is advocated due to the challenges that government/municipal management and community-based management models face (Bakker and Cook, 2011, Eguavoen and Youkhana, 2008). However, certain conditions must prevail for delegated management to be efficient. These conditions are: (i) capacity of all stakeholders to participate in delegated management; (ii) transparent decision-making process; and (iii) an in-built accountability mechanism (Bakker and Cook, 2011). The central theme in either of them is to improve efficiency in service delivery and reduce financial burden on the public sector (Isabelle, 1999, Anwandter and Ozuna, 2002).

In line with these models, especially community management, many countries have decentralised their water management. The subsequent section discusses the community-based water management approach to service delivery.

2.4 The community-based water management approach

The 1990 New Delhi Global Conference was the first time that community management was officially endorsed as an approach to water delivery. Many countries, especially SSA, adopted this approach in the water sector (Schouten and Moriarty, 2003). The following sections present the approach and its core attributes within the water sector.

2.4.1 The concept of community and the characterisation of small towns

Community-based water management needs to be understood within the concept of a "community". This is important because of the desire for user involvement in resource management (Nunan, 2015). Despite the varied explanations of the concept, Galvis et al. (1997) provide a comprehensive explanation of it, particularly, with reference to water management. They described "community" as "a group of people with some common but also some conflicting interests and ideas and different socioeconomic and cultural backgrounds. Water supply is one such common interest, but at the same time it can be a source of conflict. Some people, often the economically better off, may be better informed, may know more of the world, but may on the other hand, have certain interests in keeping the status quo and therefore may not be willing to solve certain problems. Women may have interests different from those of men and may not have been heard in the past, or their position may make it difficult to achieve changes on their own" (Galvis et al., 1997:33). Despite the complexity of the concept, in Ghana, the CWSA (1998) interprets a community as a group of households who refer to their settlement by the same name. This interpretation, although simplistic, is to facilitate the provision and management of water and sanitation services in Ghana.

Nonetheless, for Harvey and Reed (2006a), the conceptualisation of a community, for instance, by CWSA, can be misleading because there is the tendency to define it by the area that the facility services. The idea of an administratively defined community little reflects the wealth and complexity of local networks or resource use, decision-making and social interaction (Cleaver, 1999, Schouten and Moriarty, 2003). Communities already have their internal dynamics (inequalities in terms of gender, age, tribes, clans, lack of cohesion) and these dynamics are unlikely to be solved by the presence of the water systems but perhaps complicate them (Schouten and Moriarty, 2003).

Therefore, while it is difficult to avoid the usage of "community" in natural resource management one should not overlook the fact that there are variations in terms of socio-cultural, socio-political complexities, and economic power structures and that these differences shape decision-making (Nunan, 2015, Eguavoen and Youkhana, 2008). These dimensions of a community imply that for water management to achieve good outcomes, it will have to immerse itself in the existing social and political dynamics and *adapt*, rather than attempt to

change them completely. Therefore studying water requires a detailed analysis of local level rules to understand the roles and views of the varied stakeholders (Mehta, 2007).

Despite the social factors in community as a concept, the CWSA interpretation of community suggests that it could be urban or rural. Again, various countries have different parameters that are used to distinguish an urban area from that of a rural one. The focus of this study is not to incite a debate on urban and rural delineation. Rather it is important to explain 'small town' within the domain of community, considering the cases on which this study is situated.

"Small towns" are in a continuum between urban and rural, between water services with household connections and communal point sources, and between utility management and community management (Ryan and Adank, 2010). This explanation contains a lot of elements but still delineates small towns based on geographical and management approaches. However, the management approaches make it difficult to vividly categorise small towns. From the management models presented in Table 2.2 above, it remains unclear what model remains within a continuum of utility and community management. Again, regarding management approaches, small towns need not be in continuum but can be purely community managed (see, for instance, Opare, 2011, Doe and Khan, 2004, Moriarty et al., 2002).

The Water and Sanitation Programme provides a somewhat detailed explanation of small towns within the water sector. According to Mugabi and Njiru, the Water and Sanitation Programme defined "small towns" as;

> *"Settlements that are sufficiently large and dense to benefit from the economies of scale offered by piped systems, but too small and dispersed to be efficiently managed by a conventional urban water utility. They require formal management arrangements, a legal basis for ownership and management, and the ability to expand to meet growing demand for water. They have populations between 5,000 and 50,000 but can be larger or smaller"* (Mugabi and Njiru, 2006:187).

The emphasis in the above definition is on the population of the settlement and, in terms of water supply, the focus is on the ability of the population to manage it. However, the population indicator, as given in the above definition, is rather imprecise because there are no upper and lower boundaries. Mugabi and Njiru (2006) also noted that there is no consensus on "conventional" urban water utility, such that small towns cannot manage. Many countries use the population parameter. For instance, in Uganda, small towns are settlements with 5,000 - 15, 000 inhabitants (Tumusiime and Njiru, 2004) whereas in Botswana they are settlements with a minimum population of 10,000 inhabitants (Kamete, 1998).

Similar to other countries, population is the main parameter used by the CWSA, which defines small towns as communities with populations between 2,001 and 50,000. The CWSA (2010) further divides small towns into four categories, albeit based on population. These are:

category I: 2,001-5,000; category II: 5,001-15,000; category III: 15,001-30,000; and category IV: 30,001- 50,000.

This implies that there is no conventional definition of small towns: each country carves out a working definition to suit her operations. In Ghana, the categorisation is to guide the choice of service capacity (volume, distribution network) of the water system. However, the population parameter equally presents a puzzle in the Ghanaian context. The Ghana Statistical Service (2005) defines all communities with a population above 5,000 as "urban". This implies that some communities that are purely urban [by the Ghana Statistical Service (GSS) definition] are actually reported as small towns by CWSA because they fall under the CWSA operational definition of small towns. Therefore, while the GSS disaggregate data on water (using the household user survey) according to its definition, the CWSA defines the term according to the areas it operates. Similar to the CWSA, the Ghana Water Company Ltd (responsible for urban water supply) defines "urban water" coverage as the communities served by the 82 water systems where they operate. This makes it difficult to compare rural and urban disaggregated data from the agencies (CWSA and GWCL) with those from GSS (using household survey) (see MWRWH, 2009 for details on the data disaggregation challenge). In order to overcome data disaggregation challenges, the research relied on data from the CWSA with regard to access to water and the number of small towns in North-western Ghana.

Mugabi and Njiru (2006) also explained that the mix of features makes it difficult to exclusively use rural or urban approaches to service delivery. In Ghana, small towns are mostly subjected to the principles of rural water supply and management (Eguavoen, 2008), which are centred on community management, although there are design technology differences. Water design technology in rural areas differs from small towns. Rural areas are mostly served with a borehole with hand pump while small towns are supplied with piped water systems. As far as small town water systems are concerned, the water is drawn from underground or surface sources, pumped in a treated form to high level tanks (HLTs), and then distributed using a gravity-activated distribution systems (Anthony, 2007). However, many water systems in small towns in Ghana depend on underground water (see Opare, 2011, Gbedemah, 2010) and the water infrastructures are stand-alone systems. They are not connected to any centralized water infrastructure (Moglia et al., 2011). Within each stand-alone water system, there are two main ways to access water: private connections to homes and offices, and public stand-posts. Nonetheless, the systems are complex because they are made up of many interacting actors (see section 2.4.3) in which one actor's action or inaction affects the water system. The above discussion on community and small towns provides a good background to explain community-based water management.

2.4.2 Defining community-based water management

Several explanations, although similar, have been given to community-based water management (CBWM). According to Schouten and Moriarty (2003), it is about communities taking strategic decisions that respond to the following: what level of service they want, how they want to pay for it and where they want it. This explanation gives a stronger voice to communities and precludes the technical requirement for siting water facilities and policy guidelines on the mode of financing water provision. The IRC (2003), albeit focused on control, described CBWM as the functional control of the water systems by communities or their representatives. Similarly, Doe and Khan (2004) explained CBWM as a bottom-up development approach in which the members of a community have a say in their own development and assume control – managerial, operational and administrative responsibility – of their water facilities. However, Doe and Khan (2004) see the "control" dimension as a product of community empowerment. This suggests that CBWM goes beyond the water sector to look at the general development of the community.

All of these definitions emanated from an explanation given by McCommon et al. (1990). For them, the nature of decision-making over the water systems, and who is responsible for executing those decisions, are primary characteristics of CBWM. This is contained in three main components: "*Responsibility*: that is, the community takes on the ownership of, and attendant obligations to the system; *Authority*: that is, the community has the legitimate right to make decisions regarding the system on behalf of its users; and *Control*: that is, the community is able to carry out and determine the outcome of its decisions" (McCommon et al., 1990:10). The essence of CBWM is about control (Schouten and Moriarty, 2003, Doe and Khan, 2004, McCommon et al., 1990). The control element gives communities the authority to make decisions about how the water systems should be managed, including tariff setting, and the people to employ to take care of operation and maintenance activities (Schouten and Moriarty, 2003). With the control element of CBWM, it is expected that where communities cannot control many of the variables that influence their operations, they should be able to manipulate many conditions and enhance their resilience (Berkes and Ross, 2013).

The three core aspects of CBWM empower communities and their level actors to positively manipulate local level conditions to effectively manage water systems. However, sometimes, CBWM may empower some members of the community at the expense of the larger section of that community. For instance, Cleaver and Toner (2006) established that through CBWM, the management body was empowered but they acted at the expense of the poor in the community. Arguably, while the poor were not involved in decision-making, they were compelled to participate in communal labour (Cleaver and Toner, 2006). Skewed empowerment, which emanates from a CBWM approach, was also established in Kenya and Nepal (Kellert et al., 2000), where power was concentrated in few individuals. Thus, in principle

CBWM seeks to empower communities to take control of water services. However, in practice, it is not universal that such an empowerment benefits “all individuals in the community”.

In effect, *control* is what puts communities in charge of the entire water system. It is stressed that where a private sector operator is contracted to carry out the operation and maintenance of the system under the control of a community-based organisation, then that water system is still community-managed. However, where an outside agency pays the community to carry out the maintenance, while the decision-making powers rest with the outsider, then that water system is *not* community-managed (see Schouten and Moriarty, 2003, IRC, 2003). CBWM gives communities the sovereignty to handle their water issues and to be accountable for their decisions.

The idea of community sovereignty has opened another discussion about what the community can choose to do regarding a water system. According to Harvey and Reed (2006a), if the main argument in CBWM is about giving communities the opportunity to have a major say (control) about the water system, then communities should be free to say that they would prefer to opt out of direct management. In that sense, there is active community participation but not management. Although the remarks by Harvey and Reed appear hypothetical, in practice, communities can opt out of directly managing their water systems. According to the IRC (2003), CBWM *may* include elements of community involvement in the day-to-day operation and maintenance of a system. This means that community members are not obliged to engage in direct management of their water systems, but can outsource management to a third party. In few such cases where this happens, although management is delegated, the control rests with the community and the local government while the private sector carries out operation and maintenance in line with a contractual agreement.

In that regard, Opare (2011) described community management as a collaborative approach between communities and external agencies, particularly government agencies. This kind of collaboration suggests some role casting, defining what communities can and should do, and the responsibilities expected of external support agencies (Brett, 2003, Sokile et al., 2003). The above explanation of CBWM converges on one key observation: devolving *absolute management responsibility* to the communities in order for them to take charge of their “own” water supply. That is, communities remain active and not passive objects in decision-making.

Contrarily, Harvey and Reed (2006a) strongly argue that CBWM is constrained because communities remain manipulated by facilitators; they are not given adequate information and real control over choice issues, such as technology options and management options. They therefore argue that *participation* is a prerequisite for water system sustainability and community management is not (Harvey and Reed, 2006a). This argument needs to be put in

context. Participation can be understood at different levels, ranging from information provided by utilities to the public owning and managing the water services (Rouse, 2013). The argument needs to be analysed within the broader concept of participation, which ranges from outsider (authority) control to user control of the process (see Arnstein, 1969 ladder of participation). As shown in Table 2.3, understanding the ladder requires reading the table from the bottom, first step of the ladder through to the eighth step.

Table 2.3 Levels of participation

Level and form of participation	Explanation	Implications
8. Citizen Control	The have-nots obtain the majority of decision-making seats. Examples are funding of communities to run their own development projects.	Degrees of citizen power: This is where community members have a major stake in decisions about projects within their jurisdictions. They control the decision-making process, and in water management, they have managerial powers.
7. Delegated Power	Citizens have dominant decision -making authority over a programme or a plan.	
6. Partnership	Power is distributed through negotiation between citizens and power holders. They agree to share planning and decision-making responsibilities.	
5. Placation	This is the higher level of tokenism because the ground rules allow the minority/have-nots to air their views. However, the final decision rests on the power holders.	Degrees of tokenism: This implies that citizens will be heard, but cannot be guaranteed that their views will be taken on board nor do citizens have the power to ensure that their views are adhered to.
4.Consultation	The interest is in the number of people who attended the meeting or public hearing. However, there is no assurance that citizens' concerns will be taken into account.	
3. Informing	Informing people of their rights and responsibility is an important step towards legitimate participation. However, the focus is on a one-way flow of information with no channel for feedback	
2. Therapy	Citizens who are complaining are given therapy to divert their attention.	Nonparticipation: The essence of these levels is not to enable community members participate, but allow power holders to educate participants
1. Manipulation	People are put on advisory committees for the purpose of educating them or engineering their support. However, the people are not given any legitimate function or power.	

Source: Constructed from Arnstein (1969), with my personal inferences

Arnstein's ladder of participation, which was developed in the late 1960s, is still relevant in contemporary discussion on participation. As shown in Table 2.3, any of the stages constitute participation. However, the difference relates to the degree of engagement with the beneficiaries of a project, such as water projects. The significance of participation in water service provision, as argued by scholars (Cornwall, 2008, Doe and Khan, 2004, Rouse, 2013), lies within the sixth, seventh and eighth levels (see Table 2.3). More importantly, citizen control is the desired form of participation because at this level citizens can take their own initiatives without recourse to external bodies. As noted by Cornwall (2008:278), "being involved in a process is not equivalent to having a voice". But the ultimate aim of participation is to give people "voice" and absolute control to take initiatives and decision-making over resources

(Cornwall, 2008). Even where they need support (technical advice and resources), the citizens have control over such support. Thus, it is at this level that community members are empowered to take control of water management (Doe and Khan, 2004). In other words, loosely, participation can mean any of the stages in Table 2.3, but CBWM specifically gives power to the people. Hence, communities can participate without managing the water systems (in which case they have relatively less voice) and this constitutes tokenism.

A study by Narayan (1995) on the contribution of people's participation (using evidence from 121 water projects), suggests that CBWM is the *ideal* and *effective* form of participation. However, within CBWM, "*beneficiary* participation is critical for achieving project effectiveness and building local strategies" (Narayan, 1995:65). This goes to support the warning by the World Health Organisation (WHO) to recognise the distinction between "community participation (where the government and other institutions may have control) and community management (where the community definitely has control)" (WHO, 1996:5). CBWM approach is a structured process of water provision and management. For example, the process comprises an expression of interest/demand by the community and community mobilisation, which involves contribution to capital cost and formation of community-based management structures, and then actual execution of the water project (CWSA, 2014d). Following completion, daily operation and maintenance are the responsibilities of the communities (Schouten and Moriarty, 2003, CWSA, 2014d). In that respect, community management should be emphasised instead of participation (Opare, 2011, Rakodi, 2000). These arguments can best be appreciated when they are contextualised within the following guiding principles of CBWM, which were set as part of its inception in many countries.

2.4.3 Characteristics of community-based management

A set of principles that are deemed necessary for the smooth operation of CBWM was identified by governments and donors as part of the policy shift in water management (see, for instance, CWSA, 2007a, Schouten and Moriarty, 2003). As a prerequisite, CBWM requires a policy framework that permits and supports its operation, and the appropriate agencies (both government and non-governmental) are to make information available to communities to inform their decision. The framework requires communities to express demand and be willing to commit resources, including capital cost contribution towards the water system. Since communities are responsible for operation and maintenance then appropriate technology is necessary. That is, the technical designs must suit an array of factors at the community level. In order to ensure that water systems are able to adapt to future changes, especially in population growth, communities are required to proactively prepare a facility management plan to guide its day-to-day operations and cater for future expansions (Laryea, 1994, Harvey and Reed, 2006b, McCommon et al., 1990, CWSA, 2007a, Karikari, 1996, Schouten and Moriarty, 2003, Opare, 2011, Moriarty et al., 2013).

Finally, effective and continuous “external” support services are required to build the capacity of community management bodies to take up their respective responsibilities. This should be continuous because communities cannot and should not be expected to maintain capacity on their own indefinitely. That is, because policies change, community level managers migrate or exit and knowledge becomes obsolete, the conceptualisation of community-based management recognises these changes and integrates on-going support as part of CBWM (Opare, 2011, Karikari, 1996, see McCommon et al., 1990, CWSA, 2007a, Christina et al., 2013, Evans and Appleton, 1993).

These principles serve a dual purpose of ensuring the successful provision of appropriate water services to meet community needs and that these services are delivered sustainably. The technology available to a community is important and ideally communities should choose a technological water package that they can practically maintain with the available technical and financial resources (Karikari, 1996). This has to be within available technology options. Although communities are required to rely on their existing technical and financial resources, CBWM does not bar them from seeking support from external agencies, (although this should be at the discretion of the communities) nor exempt them from complying with government sector policies (Opare, 2011). There has been the tendency to see community management as an alternative to professional management as noted by Cleaver and Toner (2006), which should not be the case. What needs to be noted is that communities are not barred from employing professionals outside the community to manage their water systems, as was established by Opare (2011) in Ghana and Cleaver and Toner (2006) in Tanzania. However, the challenge is whether, given the revenue from the water systems, community level organisations can pay and maintain professional staff.

At the community level there are management bodies that are often constituted by the community members to take charge of managing the water systems (see, for example, Madrigal et al., 2011, Fuest, 2006, Cleaver and Toner, 2006, Schouten and Moriarty, 2003). For example, in Ghana, there are water and sanitation management teams (WSMTs), operating staff and vendors who interact variously around the water systems to ensure that the systems are managed appropriately (Fuest, 2006, CWSA, 2014d). The WSMTs are semi-autonomous, voluntary community-based bodies that are mostly elected or selected by the community to oversee the general management of the water system. This includes taking major decisions about the water system management, in consultation with the community members, operation staff and at times with the District Water and Sanitation Team (DWST). Operating staff are technical staff and they are directly responsible for the day-to-day management of the water systems (CWSA, 2014d).

The mode of establishing such management bodies varies from one location to the other. For example, in Costa Rica, management bodies are elected by the users and the essence is to ensure accountability of water managers to water users (Madrigal et al., 2011). In Pakistan and Cameroon, election to a water management body is based on several factors, including: (i) educational level; (ii) gender; (iii) sectional representation; and (iv) clan. In Kenya, the elders hand-picked committee members from retired public servants (Schouten and Moriarty, 2003). The use of retired public servants can bring in the professional touch that is argued for (see, for example, Moriarty et al., 2013) in water management. However, the practice of hand picking committee members does not promote user involvement in deciding who should be part of the water management committee.

Another area that is being theorised as part of the underlying principles of CBWM, especially its capital contribution, is the need to create a sense of ownership in community members. That is, imbue in community members the realisation that they own the water systems and, as such, should take up the water management (Jiménez and Pérez-Foguet, 2010, Marks and Davis, 2012, Schouten and Moriarty, 2003). It is assumed that instilling a "sense of ownership" in community members will promote sustainability of water systems. However, there are several views on this argument.

2.4.4 Community ownership of water systems

In most instances, CBWM is tagged to community ownership, and the prominence of "ownership" within the CBWM discourse requires further deliberation. This is because it is important to pay serious attention to how words are deliberately used to change resource allocation (Suddaby, 2010). As noted, ownership remains one of the vaguest words in CBWM (Schouten and Moriarty, 2003). It is often related to a "sense of ownership" which originates from community contribution in cash and/or labour towards the construction of the water system (Schouten and Moriarty, 2003, Harvey and Reed, 2006a, Marks and Davis, 2012, Manyena et al., 2008, Moriarty et al., 2013). The sense of ownership is that communities behave as if they own the water systems and they do their best to protect and sustain them, although in most cases communities have no legal ownership of it (Schouten and Moriarty, 2003, Cleaver and Toner, 2006). Theoretically, Schouten and Moriarty (2003) argue that ownership "creates a sense of maturity and responsibility". They explain that ownership is not limited to possession of the water infrastructure, but entails the community taking charge of the water problems and finding solutions to them (Schouten and Moriarty, 2003).

It is argued that a capital contribution gives communities a strong feeling of psychological ownership and presumably gives them self-esteem because they contributed (cash and/or labour) towards the acquisition of the water project (Marks and Davis, 2012). In southern Ghana, Gbedemah (2010) established that in Akatsi 35.6% and 54.8% of households indicated

that District Assembly and the donor respectively own the water system. He further established that for those who think the water system belongs to the District Assembly, they indicated that the 5% capital contribution, which the community was required to pay, was paid by the District Assembly. Similarly, in Kenya, Marks and Davis (2012) established a significant relationship between ownership and capital contribution. Community members who contributed (cash) towards the construction of water systems expressed a higher sense of ownership than those who contributed labour (Marks and Davis, 2012).

Besides capital contribution, households connect community ownership with user involvement. For example, in Tanzania, while donors and water management associations focus on community ownership, there is low level of community ownership within households. The low level of community ownership is attributed to non-involvement in decision-making. Community members want to be part of the decision-making process of projects, which are "claimed" to be community-owned. The study further established that households are of the view that managers are running the water system as if it were their private company. For that reason, the majority of users are not well informed about how the water system is run (Cleaver and Toner, 2006). The public remain passive users of water, a situation that characterised the supply-driven approach that is expected to be eliminated by a CBWM approach. Therefore, Cleaver and Toner (2006) conclude that "ownership" is the least successful of the water systems.

Beyond capital cost contribution, some scholars argue that the community should have legal ownership and control of the services (Karikari, 1996), based on the scholarly explanation of ownership. Ownership of an asset consists of the following elements: the right to use the asset; the right to appropriate the returns from the asset; the right to change the asset's form and/or substance; and the right to transfer the asset (Williamson, 1993). The key issue in the above explanation is the "right" of the individual or entity to control the various forms of the asset (the water system). Right has a legal dimension and, according to Harvey and Reed (2004), legal ownership of the resource will be vested in a community if there is a clear transfer of assets from the implementing agency to the community.

Giving legal ownership of the water systems to the communities implies that all the dimensions presented by Williamson will be vested in the communities. While this is advocated, it is unlikely to happen in situations where governments have little trust in the community and its internal dynamics, including management capacity (Schouten and Moriarty, 2003). This is particularly the case in Ghana, where the legal documents delineate ownership of general water resources and water systems in communities. In Ghana, ownership of water resources/bodies is vested in the President of Ghana (Agyenim and Gupta, 2010). The Water Resources Commission Act

states that “the property in and control of all water resources[6] is vested in the President on behalf of, and in trust for, the people of Ghana” (Government of Ghana, 1996). This is similar to other countries such as Namibia (see Falk et al., 2009).

In the small town and rural water sector, ownership (legal) lies in the District Assembly (DA). According to the National Water Policy (2007), the DA is the basic unit of government at the District level, and for the purpose of water, the DA is the legal owner of communal infrastructure, including water infrastructure. The DAs delegate management functions to the community level, and they are required to set up structures under the supervision of the DAs to directly manage the water system (CWSA, 2014). Once the DAs delegate management to the community, the DAs assume a supervisory and regulatory role over all water systems within their jurisdictions. This strongly supports the argument that community ownership is largely “psychological ownership[7]” (Marks and Davis, 2012).

Doe and Khan (2004) argue that participation and ownership depend on community characteristics and remain important ingredients of a functional water system because of their symbiotic relationship. However, Harvey and Reed (2006a) argue that ownership, although it may lead to effective management, does not necessarily translate into effective management and rather calls for a sense of responsibility towards the management of the water systems. The findings of Cleaver and Toner (2006) in Tanzania support the need to focus on responsibility in relation to ownership. The focus on responsibility enables community members to access and assess information and take decisions and actions that will ensure the sustainability of water systems (McCommon et al., 1990).

Empirical studies tend to justify the call for responsibility over water systems. For example, Juma and Maganga (2005) earlier observed that in Tanzania where water for domestic use is free, a sense of ownership of the water facility is only relevant in the dry season, a time that communities have relative shortage. Similarly, in Ghana, Eguavoen and Youkhana (2008) noticed that within the rainy season, the financial contribution of communities to water facilities dwindles, as households resort to unimproved sources. In a study on decentralised water system management in Australia, Yu et al. (2012) established that ownership does not lead to engaged-end user, although they have the power to influence and determine services delivery. This addresses the argument by Bakker (2008) that “ownership” (that is, public/community versus private) is less important than institutions (rules, norms, and laws) and governance (decision-making processes). He argues that the imposition of 'public' or 'community' management is not a “sufficient condition for better water services” (Bakker, 2008:245).

[6] “Water resources” means all water flowing over the surface of the ground or contained in or flowing from any river, spring, stream or natural lake or part of a swamp or in or beneath a watercourse and all underground water (Act, 522).
[7] Psychological ownership refers to that state in which individuals feel as though the source of ownership (materials or immaterial in nature) or a piece of it is theirs (Mark and Davis, 2012:1570)

Despite the arguments over CBWM and its facets, it is still the dominant approach that characterises the rural and small town water sector in many developing countries. After almost three decades since its inception, there has been no major shift in the approach: CBWM is still strongly held as one that empowers communities to actively participate in the entire cycle of water delivery. Nevertheless, the implementation of CBWM has produced mixed outcomes.

2.5 Expected outcomes of a decentralised water management

The preceding discussions demonstrate that the CBWM approach has been institutionalised in many developing countries. Community-based management is promoted because of its expected performance outcomes. CBWM is expected to foster a sense of ownership and give communities a greater control over the management of the water systems, which in turn would contribute to better overall performance and broader national coverage of water services (McCommon et al., 1990). It is expected that CBWM would promote trust and reduce cost of implementation because community members are required to craft rules that are adaptive to their local situations (Ostrom, 2005). Moreover, as a result of communities' strong social structure, common interest and defined geographical boundaries, CBWM is promoted as an approach that can: take care of the needs and preferences of the people; promote accountability and increase efficiency in service delivery; and equitably and sustainably manage resources (see, for example, Blaikie, 2006, Isham and Kähkönen, 2002b, Moriarty et al., 2013, De, 2009). More broadly, CBWM can result in a better technical performance, in terms of preventive maintenance of water infrastructure, improve financial sustainability and promote institutional performance in respect of designing rules that are suitable to local situations (Chowns, 2015, Ostrom, 2005). These expected outcomes of CBWM would ultimately contribute to sustainable water services delivery in rural and small towns.

The empirical literature shows that the implementation of decentralised water management has had several outcomes. In a paper on the responsiveness of decentralisation to local needs in Bolivia, it was established that, with the implementation of decentralisation in 1994, the public sector investment in water management increased and the increase was positively related to real local needs (Faguet, 2004, Whittington et al., 2009). This led Faguet to conclude that "decentralization actually led to higher investment in social services because the poorest regions of the country chose projects according to their greatest needs" (Faguet, 2004:887). This was confirmed by a World Bank study that rated the performance of Bolivia's decentralisation on poverty reduction as positive (Jütting et al., 2004). Similarly, Serageldin (1995) found that the success of the French water management model was because they were able to combine the principles of participation with accountability, both at the local and national level. In Namibia, the success of rural water reforms was attributed to a decentralised approach that incorporated existing institutions at the community level by using traditional authorities as

representatives of users, which ensured local enforcement of water regulations (Neef, 2009, Falk et al., 2009).

In terms of access, globally, the implementation of a CBWM strategy has “made progress” in contributing to increased access to water services. The target of the Millennium Development Goals (MDGs) on drinking water (an increase in coverage from 76% to 88%) between 1990 and 2015, was met in 2010. Globally, rural and small town coverage increased from 62% in 1990 to 82% in 2012, with regional variation. SSA rural coverage increased from 35% to 53% while Latin America and the Caribbean increased from 63% to 82% within the same period (UNICEF and WHO, 2014). In Ghana, access to safe drinking water in rural areas and small towns increased from 27% in 1990 to 63.66% in 2013 (CWSA, 2014b).

Despite the significant outcomes, Bos (2006) argues that it is easier, faster and more controllable to *construct* water infrastructure than it is to build up recipient capacity to *maintain* them. Additionally, it is suggested that the challenge is not so much about achieving national targets through faster provision of water supply facilities, but rather on what it takes to ensure that the supply is delivered on a sustainable basis with local commitment and capacity for planning and implementation (Giné and Pérez-Foguet, 2008, Rouse, 2013). According to Harvey and Reed (2006b), specific countries’ failure rate ranged from 30% to 60% after the reforms. For instance, in Tanzania, 46% of rural facilities did not work in 2009 while in SSA 33% of the facilities were not functioning within the same period (Jiménez and Pérez-Foguet, 2010).

2.6 Conclusion

This chapter has demonstrated that the management of rural and small town drinking water has shifted from a state-led management approach, which was characterised as inefficient, to a community-based management approach. From the review, it is evident that community-based management lies within a broader theory of decentralising resource management to local levels. CBWM has been theorised as the approach that can mitigate the problems of the water sector. Consequently, several governments, especially in developing countries, and donors have endorsed the approach as one that promotes democracy in water governance, whereby the voices of the beneficiaries shape the management of water resources. It is further argued that CBWM empowers communities to take control, responsibility and authority over their water resources.

As demonstrated in this chapter, the empirical evidence from countries showed that while there is progress in statistically achieving the targets of water provisions under CBWM, ensuring that the water services function over the expected life spans remain a challenge, suggesting that the approach is not a one-solution-fits-all. Therefore, it is important to examine the dominant

factors that drive the functioning of community-based natural resource management, particularly water resources. In other words, it is necessary to explore what makes CBWM deliver positive results in some locations and not in others. The empirical literature further suggests that there is still a strong government role in CBWM because governments still retain the legal ownership of the water systems, making government a core partner in CBWM. Therefore, a combination of government and communities in water management raises questions on the *levels* of decision-making.

3 Drivers of decentralised water management and the role of polycentricity

3.1 Introduction

This chapter seeks to explain the factors that shape community-based water management (CBWM). The chapter is divided into three main sections. Section 3.2 groups the drivers into five related categories and discusses them. These drivers are: (i) user participation in management, and the nature of existing social structures; (ii) financial resource mobilisation, accountability and transparency; (iii) human resource and leadership; (iv) incentives, corruption and political factors; and (v) technological and technical factors. Based on the drivers of CBWM, section 3.3 discusses polycentricity and its significance in CBWM, highlighting the role of the state within a decentralised system of resource management. The chapter concludes in section 3.4 by pointing out the need for a theoretical framework to critically examine CBWM in small towns in terms of its outcomes and the processes leading to the outcomes.

3.2 Drivers of community-based water management

A mixture of factors has been identified as the cause of successful and unsuccessful CBWM. According to Berkes, it is inappropriate to ask whether community-based management is successful or not, or whether it is appropriate or not. Instead, it is important to understand the conditions under which it works successfully or does not work successfully (Berkes, 2004). This supports the view of Acheson that there is no universal solution to resource management challenges because a set of challenges often cause failures (Acheson, 2006), and they vary from one location to another. In that respect, what is appropriate in one setting may not be appropriate in another because of different local situations. As indicated in the introduction of this chapter this section presents a set of related factors that have influenced CBWM.

3.2.1 User participation and socio-cultural factors

There are several levels and, for that matter, interpretations of participation (discussed in chapter two), but Madrigal and colleagues provide a description that best suits a discussion on CBWM. According to Madrigal et al. (2011:1671), participation means that “communities have relevant information about the system; their opinion is taken into account; and they have the opportunity to propose, modify or reject rules related to water management”. This definition gives participants a strong voice in water management and they feel part of the outcome of the water management. The argument is that, when people are convinced that their views are included in the decision-making process, then their institutional acceptance (the extent to which an individual endorses a set of rights, rules and decision-making procedures) tend to increase because users get a sense of self-determination and procedural justice in water management (DeCaro and Stokes, 2013).

Besides the external (experts') views, the community level conceptualisation of participation is also significant. It is mostly influenced by the informal institutional configuration, such as cultural norms, gender perception, class and race, and these must be recognised and provisions made to tailor participatory approaches to suit the local conditions and their understanding of participation (i.e. participatory fit) (DeCaro and Stokes, 2013). In CBWM, this is *expected* to present fewer challenges because local people are familiar with local conditions. It is further advanced that the best mode of public participation is one that brings actors together to "exchange knowledge and action through face-to-face" (Neef, 2009:57). This approach is particularly relevant in rural settings in developing countries, where alternative means of exchanging knowledge using contemporary technology is limited. Although this mode is expensive in terms of the time required to arrive at a consensus during community meetings, it creates transparency in decision-making and minimises resistance to outcomes.

Some studies support the above argument. In parts of Ghana, participation of communities throughout the project cycle was found to be a contributory factor to successful community management (Doe and Khan, 2004). Gender balanced participation (especially the involvement of women) in water management is established to have better performance in in parts of Costa Rica (Madrigal et al 2011). In Nepal, Bhandari and Grant (2008) established that non-involvement of women in water management issues caused water systems failure. These studies complement earlier research conducted by Cleaver (1999) in Tanzania, which showed that women's participation in management is a prerequisite to sustainable water delivery. Cleaver explained that even the presence of relatively few women in CBWM decision-making had an impact on other women. This is because "when women spoke at public meetings, they were representing other women but when men spoke, they were speaking as individuals" Cleaver and Kaare (1998) cited in Cleaver (1999:602). That is, sometimes women do not participate *simply* because the institutional arrangements require their participation in resource management but for personal reasons (Raha et al., 2013).

The potential for women to participate partly explains why the third Dublin Water Principle and other legislative policy documents made provisions [8] for female participation in water management (see CWSA, 2011, CWSA, 2014d, Rogers, 2006). The primary focus is to ensure that women's concerns are factored into water management decisions, although in reality, the voices of women are not heard during community meetings. For example, it was established that although women are active at the household level and contributed labour towards water projects, they are barely heard at community level decision-making (Raha et al., 2013).

[8] Although the provisions are contradictory. The Legislative Instrument (LI2007), First Schedule, Section 1 indicates that at least one third of WSMT members should be women (CWSA, 2011) while the Project Implementation Manual of the CWSA indicates that at least of 40% of WSMT should be women (CWSA, 2014e).

Not all studies have found that female participation in CBWM influences performance, as established by Madrigal et al. (2013) in Costa Rica and Prokopy (2004) in India. However, this does not suggest that the participation of women is not necessary, because such cases are location specific. More importantly, these studies do not indicate whether the same management results would have been attained if females did *not* participate at all in water management.

While it is recognised that user participation is important, especially in minimising conflict in water management (Saleth and Dinar, 2005, Saleth and Dinar, 1999, DeCaro and Stokes, 2013, Neef, 2009, Cornwall, 2008), occasionally the social systems/local settings can be favourable or unfavourable in realising gender equity in water management, and it sometimes requires external intervention to compel institutions to mainstream gender in their daily activities (see Giné and Pérez-Foguet, 2008, Agrawal and Perrin, 2009, Raha et al., 2013). Sometimes it is difficult to change the entrenched power structures of societies (Brett, 2003) in order to promote user participation. Besides the power structures, sometimes the participation of women is affected by several factors, including low self-esteem, low self-confidence, overburden with household work and inadequate leadership experience (Prokopy, 2004, Raha et al., 2013). In water committees, where the majority of members are young women, management of the water system usually suffers after they marry (Schouten and Moriarty, 2003). Such demographic changes raise questions on the boundary rules (entry and exit procedures) to management structures. The ability to adapt to socio-political structures and changes in management structures is important in water system outcomes (Flora, 2004).

Linked to the social structure is local capture (Bardhan and Mookherjee, 2006), and how the enforcement of rules regulating water management is strongly influenced by social capital (Isham and Kahkonen, 2002a). Social capital is the "goodwill available to individuals or groups. Its source lies in the structure and content of the actors' social relations. Its effects flow from the information, influence, and solidarity it makes available to the actors" (Adler and Kwon, 2002:23). Social capital encompasses both individuals and collective actors and, as such, plays a role in analysing power dynamics in community-based management (Ballet et al., 2007). It is premised on the notion that social bond and norms are necessary components of a community (Pretty, 2003). Hence, social capital depends greatly on the existing social bonding in the community as well as the cultural characteristics, in terms of rules and norms of that community (Ballet et al., 2007). Social capital was found to be strong in villages with boreholes with hand pumps and thus contributed to improved water services. However, villages with complex piped water systems did not have the necessary social capital to respond to the demands of community-based management (Isham and Kahkonen, 2002a).

Social bonding is a form of social capital whereby favours are more often tacitly exchanged. It relates to 'internal' (within-group) ties with much attention on the actor's characteristics: attributes that reside in people's head and cannot easily be noticed or changed. It is a dimension of social structure that lays the foundation of social capital (Ballet et al., 2007, Adler and Kwon, 2002). Social bonding is often identified with the "very frequent social interactions" (Ballet et al., 2007:359), implying that it has to be systematically renewed to ensure its continuous functioning (Adler and Kwon, 2002). Despite the advantages of social bonding, such as internal solidarity, it has the tendency to create exclusivity in a network of relation (Adler and Kwon, 2002), especially in natural resource management.

Empirically, social bonding (preferential treatment) and power asymmetries were also identified as factors affecting water distribution in irrigation systems (Saravanan, 2008). Consequently, marginalised individuals have devised strategies to access water. In fact, Saravanan (2008) classified the strategies as "resistance-based" (water stealing and use of abusive language in order to access water) and "resignation-based" (others withdraw from taking any action). For those who use "resignation-based" they lamented with statements such as "what can we do in a world where might is right" (Saravanan, 2008:210). These statements imply that those who use resignation-based strategies consider themselves as the vulnerable in accessing water, and may suffer water deprivation as long as the existing management approach, characterised by power differences and preferential treatment, is maintained. Although individuals have devised strategies, they are counterproductive in the long term because of the consequences on revenue mobilisation and social cohesion.

3.2.2 Financial resource mobilisation, accountability and transparency

Revenue mobilisation: Revenue mobilisation from water remains significant irrespective of the form of management model because it is practically impossible for a water supply to be maintained at a reasonable level if the water revenue cannot cover the cost of services delivery (Biswas and Tortajada, 2010, Rouse, 2013). CBWM has particularly placed the financial responsibilities of water systems on communities (Schouten and Moriarty, 2003, Karikari, 1996, Harvey and Reed, 2006b, Opare, 2011), and financial capacity remains critical, although limited in most cases (Maras, 2004, Rouse, 2013). The nature of water system technology has implications on finances, especially at the community level (Madrigal et al., 2011). As such, the ability of a community to raise funds to meet its operation and maintenance will have repercussions on the functioning of the water systems.

This makes tariffs an important component of water management. Tariffs serve two main purposes: the first is to raise funds for the operation of water and at times to recover the investment cost, and secondly to conserve water usage, because the absence of tariffs can result in anti-conservationist practices (Tortajada, 2010a). This complements the argument

that financing services delivery through user fees is an effective mode of raising revenue since it is non-coercive and users can regulate their usage to match with their payment ability (Bardhan and Mookherjee, 2006). Despite the significance of tariffs, there is no consensus on the best approach to water pricing because there are contextual factors, such as socio-economic and political issues which are location specific (Tortajada, 2010b) and this often results in low and/or arbitrary tariffs that can result in extravagant water usage (Manyena et al., 2008, Biswas, 2006). This, in most instances, benefits the rich. For instance, Rouse strongly argues that "low tariffs do not help the poor: on the contrary, they deny them a decent water supply" (Rouse, 2013:62). The poor are unable to pay for the connections of water to their homes, and thus, rely on water vendors. He further established that the poor pay vendors up to 25 times more for a litre of water than those who have tap water supply (Rouse, 2013). Rouse maintains that the poor cannot save to pay monthly water bills in rural communities, and as such, pay-as-they-go is appropriate for them (Rouse, 2013). Therefore, an appropriate system of billing and revenue collection is a prerequisite in water management (Rondinelli, 1991, Tortajada, 2010a).

Given the centrality of revenue generation in water management, Schouten and Moriarty (2003) contend that in communities where the educational level of the members is low but their economic status is high, adaptive capacity can still be strong. Arguably, members will have the means to contract the services of technical experts, as and when their services are needed. The findings of Opare (2011) in Ghana and Cleaver and Toner (2006) in Tanzania, where the water systems were able to generate enough funds to pay for professional management, support this argument. However, this is context specific and not wholly tenable because a low educational level could also affect the administration of local level funds, which might be mismanaged and not be available at the time needed to pay for the services of technical experts. Again, where economic status is high, the elite can comfortably evade payment of the tariff and push the tariff burden onto the poor (see Biswas and Tortajada, 2010, Manyena et al., 2008). Hence, a blend of community level skills and financial viability should be emphasised. However, the imperative of financial resources in CBWM cannot be ruled out. Financial resources allow management staff to self-finance their own decisions and investment plans (Madrigal et al., 2013), and several empirical studies attest to the relevance of financial resources in CBWM.

It has also been observed that the challenge with many water systems is not so much with financing current management but with major replacement in the long-run (Giné and Pérez-Foguet, 2008, Opare, 2011). Sustainable financing is particularly significant in water systems that use diesel to operate the central pump (Eguavoen and Youkhana, 2008). For instance, in Atebubu (southern Ghana), it was observed that the regular increase of diesel prices, irregular provision, and break downs of the generator, posed challenges on the financial sustainability,

especially in the rainy season, when the community reverted to unimproved water sources (Eguavoen and Youkhana, 2008). This implies that the availability of alternative water sources affects financing of water systems, as also identified by Manyena et al. (2008) in Zimbabwe.

*Accountability and transparency***:** Resource mobilisation alone is not enough to guarantee effective CBWM. Once CBWM depends largely on user fees, accountability for water revenue is an important requirement for continuous payment by users (Serageldin, 1995, Milman and Short, 2008, Opare, 2011, Rouse, 2013). Although some management structures are somewhat autonomous, autonomy and accountability are directly linked. That is, service providers are required to give account of the autonomy that has been granted them to operate (Schwartz, 2008). In this study, accountability is used in its broader sense and relates to what Laban (2007:356) referred to as "taking responsibility for one's own behaviour and actions, at the same time being able to account for the effects of such behaviour and actions to others". Such a perspective on accountability gives it a forward and backward linkage. That is, at any level, actors should be rendering accounts of their actions or inactions. Nonetheless, in CBWM, the intermediate can facilitate accountability through control rules, while also rendering accounts of their actions (see Brown et al., 2012, Opare, 2011).The presence of the intermediate level also provides a neutral ground and this facilitates inclusion of interest and aspiration of various sections of community in water management (Laban, 2007).

Despite the facilitative role of an intermediate level, Ribot et al. (2006) posit that decentralised resource management requires the establishment of accountability mechanisms or institutions at all levels. The election of community members into management positions is a means of promoting downward accountability (Ribot et al., 2006), but that has to be supported by access to audit reports and community meetings (Madrigal et al., 2011). Information dissemination is central in ensuring transparency and accountability in water management (Tortajada, 2010b, Rouse, 2013). While accountability is undoubtedly important in water management, it is argued that the chain and content of accountability (that is, accountable to whom on what) remains uncertain and requires clearly established and enforced rules (Tortajada, 2010a, Tortajada, 2010b). A panel of experts during a discussion observed that accountability was enforced during the infrastructure provision phase while during operation and maintenance, including services delivery, it was de-emphasised (Tortajada, 2010a).

Payment for water services in CBWM is mostly tied to accountability and transparency. In India (Karnataka regions), households were found to be willing to pay tariffs in situations where they have clear knowledge of the usage of the revenue, irrespective of whether they participated in decision-making or contributed towards capital costs (Prokopy, 2005). Accountability to community members, as opposed to accountability to government units only, was also found to be an influential factor in water system performance. This is because community level

accountability mechanisms, such as meetings, ensured that the concerns of the customers were reflected in the water management issues (Madrigal et al., 2011, Opare, 2011). Good public consultation on water management created trust between customers and management, and they readily reported leakages and illegal connection to management staff (Rouse, 2013). According to Madrigal et al. (2011), access of community members to a detailed presentation of revenue and expenditure pattern and the extent to which consumers can exert pressure on local level water organisations enhances their performance in water systems. Accountability to users was found to have increased customer satisfaction in water services (Madrigal et al., 2013) because it increases confidence and trust in management staff.

On the other hand, in an analysis of decentralisation and accountability in developing countries where user fees are applied, Bardhan and Mookherjee (2006) established that local elites, who incidentally are the main users of services, often evade tariff payments and free ride on what is paid by the poor. This also was established in Phnom Penh, where senior officers evaded payment of water tariffs (Biswas and Tortajada, 2010). There are also instances where ordinary users are not willing to pay tariffs. However, in most cases, the major reasons for non-willingness to pay are the arbitrary setting of water tariffs, the absence of punitive measures for non-payment, and the lack of transparency by water management staff (Manyena et al., 2008, Rouse, 2013, Schouten and Moriarty, 2003). This often affects the financial resource base of the associated water systems. For instance, it was estimated that in Phnom Penh about three-quarters of the water produced yielded no revenue (Biswas and Tortajada, 2010), and in general, it is estimated that tariffs cover about 10% of the operating cost in developing countries (Tortajada, 2010a).

Besides the effects on tariffs payments, the lack of accountability and transparency in water management often sparks user agitation, especially where users lose faith in the water management staff (Harvey and Reed, 2006a). For instance, in Tanzania there were calls for a change of water management staff for not being accountable to the communities they were servicing (Cleaver and Toner, 2006). Similarly, despite the successes of CBWM identified by Opare (2011), community members still demanded an update on financial and other issues. Relatedly, some community members in Uchira (Tanzania) called for a change in management staff because of a lack of accountability of water revenue and the non-involvement of community members in decision-making (Cleaver and Toner, 2006). Similar calls for change of water management leadership are identified by Rouse (2013). Demands for a change in management and calls for accountability by community members is sometimes a sign that they care about the successful operation of the water system (Opare, 2011). Another incidence was the Cochabamba water conflict where residents used road blocks, strikes and other civil protests to highlight their concerns over tariff increments and the public control of water systems (Bakker, 2007, Wolf et al., 2005).

From the foregoing analysis, it is evident that accountability and transparency are relevant in water management, raising questions about the institutional arrangements and the extent to which these recognise and integrate issues of accountability and transparency in water management. Beyond questioning the institutional arrangements, the type of leadership and the skills of the management staff are equally important in facilitating accountability, transparency and revenue generation.

3.2.3 Human resource and leadership

Human resource, in terms of technical skills, remains a key component in the functioning of any operation, and it is particularly imperative in CBWM (Madrigal et al., 2011, Flora, 2004, Harvey and Reed, 2004). Human resource of water organisations plays an important role because they are responsible for devising and enforcing rules that affect water performance (Madrigal et al., 2011, Flora, 2004, Neef, 2009). Any potable water infrastructure, other than a well or open protected spring, will definitely have mechanical failures and, as such, the competence of the leadership at the community level is important to the functioning of facilities (Schouten and Moriarty, 2003). Hence, the quality of human resource, described by Flora as the “native intelligence, skills, abilities, educational level and health of individual” (Flora, 2004:8) at the community level can contribute to an effective functioning of community level water structures (Jones, 2011). According to Goodman et al. (1998), where the requisite technical skills are not available at the community level, they should be able to access it elsewhere. In a study of small water systems in rural America, Maras (2004) identified technical capacities as critical in water system functioning, although such capacities were limited. Despite the existence of technical expertise outside the community to be contracted, paying the associated fees was a challenge (Maras, 2004).

The findings of Maras gave impetus to Harvey and Reed (2006a) when they questioned the practicality of CBWM in developing countries when even in developed countries there are pitfalls. Flora (2004) has a different view on the suitability of CBWM, regardless of developed or developing country. She explained that, unlike urban communities, the small population of rural and small towns suggests less diversified skills. Consequently, a few individuals assume multiple functions that are executed by complete departments in cities. As a result "when they struggle to fulfil these functions/responsibilities, outsiders often attribute those struggles to a lack of native intelligence, rather than task overload" (Flora, 2004:8). Two issues emerge from Flora’s argument. It presupposes that there are few people at the community level with the requisite skills and, as such, they are overburdened. Secondly, community-level staff have an adaptation challenge with multiple tasks. Thus, limited skills at the community level cannot be ruled out as an influential factor in CBWM.

A panel of water professionals during a discussion noted that leadership in the public sector, especially with regards to water management, remains fragile and questionable (Tortajada, 2010a) and earlier studies support their assertions. In irrigation management, inadequate and inexperienced leadership was identified as a key factor affecting water distribution (Saravanan, 2008). Saravanan (2008) established that 67% of households identified leadership limitations as the key factor affecting water distribution. Another 75% perceived inefficiency in water delivery to be caused by limited experience in management (Saravanan, 2008). Similarly, in Zimbabwe, Manyena et al. (2008) established that ineffective and inefficient leadership of community level management structures were associated with poor water management. For example, it was established that due to poor leadership, routine maintenance services of water facilities were not carried out and broken facilities had at least six months downtime. The main causes of poor leadership include a lack of constitutions and bye-laws (rules) on water management, the handpicking of leaders by community elders without a specified tenure of office, and a lack of incentives (Manyena et al., 2008).

On the other hand, the success of water sector reforms were partially attributed to good leadership, strong institutional culture, professionalism of staff and the level of support from government (Schwartz, 2008). In India, Ostrom found that irrigation systems that have strong positive leadership (with entrepreneurial skills and command respect) increase their likelihood of self-organisation (Ostrom, 2009). Consistency and long service in the leadership of water management was also found to support water systems' performance (Prokopy et al., 2007, Madrigal et al., 2013, Madrigal et al., 2011). In Costa Rica, high performing water organisations were found to have a stable leadership of about 7 years tenure (Madrigal et al., 2011). While experience is important in overcoming the challenges of water management, it is important to be watchful of the presence of local tyranny (selfish domination of local leaders) (Andersson and Ostrom, 2008). They have the potential to crowd out the participation of the remaining community members, potentially leading to a breakdown of the water system (Madrigal et al., 2011). Such leaders change community-based rules to suit their interest, which is worse in situations where users have no alternative access to water resources (Andersson and Ostrom, 2008). Power provokes a particular group to impose its virtues and values on the other (Flora, 2004), deepening divisions among community members with grave implications on utilisation and payment for water services. In southern Ghana, it was established that the performance of water systems deteriorated as WSMT members stayed beyond their tenure of office. Consequently, the WSMT was reconstituted (change in leadership of WSMT), and this brought dynamism and a fresh zeal in water management areas, such as community meetings and financial reviews (Opare, 2011).

Additionally, it has been recognised that community level synergy is enhanced when leaders of community level structures are able to galvanise the participation of the community members,

including women (see Goodman et al., 1998). For example, the presence of a strong kinship (social structure) network may increase adaptive capacity by allowing greater access to economic resources, increasing managerial ability, supplying supplementary labour and buffering psychological stress (Smit and Wandel, 2006). This further justifies the significance of good leadership as a contributory factor to efficient water management.

However, it is important to note that leadership only steers the community and too much emphasis on leaders will neglect the foundation on which sustainable models for governance depend, i.e. user involvement (Madrigal et al., 2011). Over emphasising leadership can breed identity politics which can create social disintegration and that will subvert water organizations (Taylor, 2002, Madrigal et al., 2011). That is why Barnaud et al. (2010) emphasised that without an analysis of the socio-economic and political milieu, the interest of the minority may be compromised in service delivery. They argue that facilitators need to stay aside and study the power asymmetries within community level leadership and apply the appropriate facilitation approach to bring all stakeholders to a common understanding (Barnaud et al., 2010). This will ensure that leadership remains accommodative to community concerns during water management.

3.2.4 Incentives, corruption and political factors

Motivation of community level actors and government officials has for a long time been recognised as a contributory factor to a successful CBWM. During the early years of CBWM, Rondinelli (1991) established that the benefits that individuals get from water (in terms of time saving), a sense of ownership and control by the community, and formal recognition of participants in water management are enough motivations to promote its success. The incentive factor is perhaps heightened in contemporary water management and often comes with illegal management practices.

For example, in Tanzania, although vendors received commission (20% of revenue collected), they charged twice the approved rates in order to raise enough money (for private use) to compensate for the time spent at the stand-posts (Cleaver and Toner, 2006). Vendors resigned because of low remuneration when management staff were informed of the variation and the approved tariff was enforced. Those who remained at post insisted on an increase in the tariff at the stand-post (Cleaver and Toner, 2006). It was established that limited motivation (low salaries) is partly responsible for inefficiency in water organisations (Biswas, 2006). Similarly, in Zimbabwe, failure of water systems was partly due to traveling long distances to attend to water systems without means of transport. This was a disincentive to operating staff (Manyena et al., 2008).

In a keynote address at the International Water Association Congress in 2006, it was mentioned that customers paid bribes for their meters to be falsified while others paid bribes to get illegal subscriptions (Rouse, 2013). These practices undoubtedly contribute to revenue loss. Thus so long as corrupt practices exist, continuous functioning of water systems is at risk.

More recently, motivation from outside the community level (especially the intermediate level) has been recognised as a contributory factor to CBWM success. Harvey and Reed (2006a) found that in Ghana where a local NGO provided monitoring visits and technical advice to communities quarterly, 86% of all water systems in 44 communities surveyed were functioning effectively. Regular monitoring and auditing of WSMT's activities also contributed to improved water system management (increased revenue and improved financial management, effective community engagement and submission of reports to District Assembly) in parts of Ghana (Opare, 2011). Similar positive relationships between regulatory functions and the functionality of water systems were found in Zambia (Harvey and Reed, 2006a) and Colombia (Smits et al., 2013). This has implications for the levels of governance (polycentricity) in water management (see section 3.3.1 below).

Political interest at the local government level, which leads to interference in management and decision-making, also affects water services delivery. That is, a lack of separation between political alignment and water management contributes to inefficient water management (Biswas, 2006). Where those in management positions are the favourites of political heads, then it implies that anytime there is a change in political head, then the management bodies and their vision for water management equally change, thus depriving the water system of a long term coherent management strategy (Biswas, 2006). Interventions within the water sector usually do not get implemented or take a long time due to the political characterization of water and the tendency for short-term political interest to hinder long-term goals (Turral et al., 2011). Political rivalry led to water management problems in Colombia because community level political groups struggled for control of water management positions, sometimes resulting in statements designed to intimidate officers into resigning (Schouten and Moriarty, 2003).

In Bolivia, Guatemala and Peru, Andersson and Ostrom (2008) established that institutional incentive surpasses technical and financial resources in resource management. Accordingly, local politicians mostly invested in resource management when they perceived institutional incentives to invest. These incentives can be financial rewards, re-election into office, and increased social standing in society (Andersson and Ostrom, 2008). In the same vein, where politicians anticipate that enforcement of water management rules will have negative political repercussions, sanctions are not applied even where they are deemed necessary (Manyena et al., 2008). There is an equally strong perception of politicians that charging the appropriate and realistic tariff will have political costs, especially during election (Tortajada, 2010a). As

such, increasing tariffs requires political courage (Rouse, 2013), where politicians are ready to sacrifice political gains for improved performance of the water systems. Thus, adverse political scenes have been detrimental to CBWM.

3.2.5 Technological and technical factors

The technological package of water systems is tied to technical skills. This partly underpins calls for the professionalism of water management, and the need for training of community level organisations in operation and maintenance, and financial administration (Moriarty et al., 2013, Schouten and Moriarty, 2003, Opare, 2011, Cleaver and Toner, 2006). The technical complexity of water systems affects actors' ability to detect failures (Madrigal et al., 2011). This is especially the case where the water system involves several distribution networks that require several spare parts and technical skills. In such cases, the state of spare parts also influences the continuous functioning of water systems. Harvey and Reed identified four conditions (the four "A"s), which are necessary for a sustainable supply of spare parts and the smooth operation of water systems:

> "Availability (parts are in stock or can be rapidly delivered); Accessibility (customers are aware of where to find the nearest outlets for spare parts); Affordability (priced within the means of the target customers); and Appropriateness (spare parts are of correct specification and good quality)" (Harvey and Reed, 2006b:32).

In many countries, the supply of spare parts rests with the open market. They noted that private sector involvement is diminishing due to less profits in the sale of spare parts (Harvey and Reed, 2006b).

The state of the 4As and the ability of water managers to respond to them can also have consequences for water quality and water loss. Biswas (2006) postulated that a water quality problem is likely to be a serious challenge. The presence of low pressure and leakages facilitate the infiltration of pathogens through cracks in pipelines, leading to water quality problems (Madrigal et al., 2013, Gonzalez-Gomez et al., 2011). Poor quality of water in Tanzania was also attributed to poor maintenance of water infrastructure rather than natural source pollution, and lack of quality has created non-satisfaction among consumers (Jiménez and Pérez-Foguet, 2010), with repercussions on the smooth running of the water systems. Therefore, the quality of water depends on action taken (or not taken) by service providers and the state of the 4"A"s (Madrigal et al., 2013, Harvey and Reed, 2006b).

Water management also hinges on the existing technical practices (Tortajada, 2010a). For example, in Tanzania, over utilisation of pumps, especially in the dry season, was found to be the major cause of frequent breakages, while pipes are often washed out during the rainy season due to poor trenching (Christina et al., 2013). Exposed distribution pipelines are at risk of bursting, leading to water loss. Although water loss is inevitable in piped systems, there is no universal consensus on the acceptable non-revenue water proportion. The CWSA focuses

on physical loss, which certainly has implications on revenue loss. Accordingly, the acceptable level of physical loss for a new scheme is 10% - 15%, while a scheme that is operating but needs rehabilitation is 15-20% (CWSA, 2014a). Arguably, general water loss for developing countries should be targeted at less than 23% and developed countries at less than 10% (see Gonzalez-Gomez et al., 2011).

Based on the review on technical efficiency and water loss, it is evident there is a cyclical linkage where water loss results in revenue loss and the ripple effects are felt in terms of resource availability to access spare parts. Besides leakage, the capacity of the water system to meet demand is important. Hence, even where leakage is at an acceptable level, some water systems may not have the capacity to deliver to meet population demand (Rouse, 2013). Therefore, overcoming the technical limitations and increasing water production capacity requires the collaborative efforts of all actors.

The preceding review demonstrates that decentralised water management, especially CBWM, is facilitated or hindered by several interrelated factors. This confirms the argument of Berkes (2004), that it is inappropriate to ask whether CBWM is successful. This is because factors that facilitate CBWM in one location can hinder it in another setting. This notwithstanding, within the wider institutional pillars of centralisation and decentralisation, and particularly within the context of the various models of decentralised water management (see Table 2.2 above), it is important to explore the institutional framework under which decentralised CBWM is appropriate.

3.3 Community-based water management and polycentricity

As countries institutionalise decentralised water management, it is important to understand the institutional framework within which the sector operates. Based on the discussion in section 3.2 it is important to recognise that as long as governance hinges on human beings, we can never have a perfect situation, be it decentralised or centralised. Hence, it is imperative to recognise the imperfection in water governance, as cautioned by Andersson and Ostrom (2008), and the need to understand the circumstances that determine the appropriateness of CBWM. Schouten and Moriarty (2003) argue that CBWM is appropriate for dispersed rural communities and poor communities. They were quick to add that in developing countries, communities often are left without technical support and yet external actors overwhelm them (communities) with idealistic expectations (Schouten and Moriarty, 2003). On the other hand, the relevance of CBWM in developing countries and poverty stricken communities was questioned (Manyena et al., 2008, Harvey and Reed, 2006a).

Given the analysis of the CBWM, including its theoretical foundation (discussed in chapter two) and the empirical driving factors, the appropriate approach to water systems management in

the view of Pahl-Wostl and colleagues is polycentric. A polycentric system of governance in complex adaptive systems such as water systems, is a balance between bottom-up and top-down processes, with broader stakeholder participation (Pahl-Wostl et al., 2011). Hill and Engle (2013) share similar views: in a study of adaptive capacity within the context of institutional arrangements for water management, they concluded that top-down (centralised) and bottom-up (decentralised) approaches need to be balanced in order to ensure adaptive capacity, both proactively and reactively to climate change. This will require recognising and integrating the central role of government in existing decentralised resource management. Polycentricity recognises the imperfection of the two resource management regimes but draws on the usefulness of the two.

This means that there is no single institutional solution to the problems with the water sector. A polycentric system of governance is required whereby the regulatory and facilitative roles of state agencies are needed, irrespective of the management regime (private, municipal or collective) in place (Meinzen-Dick, 2007). From a polycentric approach, the focus is not on dominance of a central authority over all actors. Instead, it is to provide the relevant actors within a system, such as a water resource system, the opportunity to interact, innovate and adapt (Andersson and Ostrom, 2008, Ostrom, 2005). The centres of decision powers and authorities function in a consistent manner through interaction (Ostrom et al., 1961, Ostrom, 2005). Therefore, it is appropriate to examine how the institutional arrangement for CBWM facilitates or constrains such an interaction among actors.

3.3.1 Polycentricity: the state's role in decentralised water management

Within the governance and institutional spheres, "polycentricity" as a concept was first applied by Elinor and Vincent Ostrom. It was used to explore the relevance or otherwise of the diverse array of agencies engaged in public services delivery in metropolitan areas of the United States (Ostrom et al., 1961). Since then, it has been applied to the study of infrastructure/resource management (see, for instance, Andersson and Ostrom, 2008, Falk et al., 2009, Huitema et al., 2009), and global environmental/climate change (Ostrom, 2010, Andersson and Ostrom, 2008). While there are arguments over the prospects of decentralisation and centralisation in resource management, polycentric theory contests that neither is good nor bad. Instead, the theory "looks at the useful contribution that can be made at all levels, by state, by private association, by associations of individuals supported by their own institutions of informal reciprocity, and by complex multi-sectoral arrangements that cross many levels of government/private organisations" (Mansbridge, 2014:10).

Characteristically, a polycentric system of governance is comprised of (i) multi-level: decision-making authorities at different levels such as local, provincial, national, regional and international; (ii) multi-type: the authorities that have roles in resource management may have

general-purpose nested jurisdictions such as town/village or district councils while others are highly specialised structures (for example, water management committees) and cross-jurisdictional political units (such as special districts); (iii) multi-sectoral: the structures of resource management entails different sectors such as public, private, voluntary, and community-based organisations; and (iv) multi-functional: the structures can have several functions such as production, financing, coordination, monitoring, sanctioning and dispute resolution (McGinnis, 2011:171, Nunan, 2015:75, Ostrom, 2005).

These characteristics show that a polycentric regime of resource governance involves distribution of functions, responsibilities and authority across multi-levels, often in a nested hierarchy, in which the authority is not vested in a single level (Pahl-Wostl et al., 2012). The presence of different centres of decision-making authority, which are formally independent of each other, requires effective vertical and horizontal coordination to ensure higher performance (Pahl-Wostl et al., 2012, Ostrom et al., 1961). The functions of the different but interrelated units has to be *coordinated*, although the final decision-making does not rest on any single centre (McGinnis, 2011).

With these properties polycentric governance is argued as crucial in resilient water management (for example, Huitema et al., 2009, Rijke et al., 2013) because polycentric systems are assumed to have a greater ability to adapt to changing environments, which leads to higher performance (Ostrom, 2010, Pahl-Wostl et al., 2012). For example, in an analysis of 29 river basins in Latin America, Europe, Asia and Africa, Pahl-Wostl et al. (2012) established that vertical and horizontal coordination played a significant role in regime performance. Additionally, the interaction that is inherent in polycentric systems of governance promotes knowledge sharing, innovation, trustworthiness and cooperation of actors (Ostrom, 2010).

The inception of polycentricity from a governance perspective was tagged to self-governance capacity at the community level (see, Huitema et al., 2009, Ostrom et al., 1961). It has been argued that polycentricity promotes self-organising forms of resource governance (see, for instance, Ostrom, 2005, Andersson and Ostrom, 2008, Ostrom et al., 1993), which for Neef (2009), can potentially *reduce* the centrality of government in resource governance. This does not make the presence of government in resource governance irrelevant (Mansbridge, 2014), because even service providers who are autonomous have to be regulated by institutions to ensure that they deliver water services as expected (Schwartz, 2008). Rather, this makes the presence and enforcement of regulatory frameworks in resource governance imperative.

Furthermore, in a review of Ostrom's concept of common pool resource governance, Mansbridge (2014) debunks the belief that Ostrom was against state action in complex resource systems' governance. Instead, Mansbridge points out that the state has four central

roles in polycentric systems, namely: “to threaten to impose solution where the local actors fail to arrive at a consensus; to provide credible and sometimes neutral information to local actors; to provide a venue for negotiation in which low-cost and enforceable agreement can be reached; and to monitor compliance and sanction defection from compliance in the implementation stage after an agreement has been reached by parties” (Mansbridge, 2014:9). In that respect, government units are able to neutralise local tyranny and inappropriate discrimination that are potentially inherent in decentralisation. This approach blends scientific information with local knowledge, and allows best practices in resource management to be easily shared (Ostrom, 2005). This is particularly relevant in small town water management, where government departments oversee water systems in different locations within their jurisdictions, and can facilitate the sharing of best practices among water managers.

However, research that seeks to link polycentric governance to institutional performance is limited, and this is challenged by a lack of consensus on benchmarks for measuring such a linkage (Huitema et al., 2009). It is posited here that looking for an acceptable scale of measuring may be less important in a study like this. What is significant is to understand the concept and contextualise it to suit a particular study or discipline in order to explore how polycentricity is reflected in institutional arrangements and practices, and its outcomes thereof.

According to Andersson and Ostrom (2008), the difference between conventional thinking of decentralisation (discussed above) and polycentric-based decentralised resource regimes lies in the scope of analysis. To better understand decentralised resource management outcomes, a “polycentric analyst looks beyond the performance of the local government unit to consider the relationship among governance actors, problems, and institutional arrangement at different levels of governance” (Andersson and Ostrom, 2008:77). This is because each actor acts independently but within a geographically confined domain of authority, which in some cases may be the district (Ostrom, 2005). Arguably, this makes all water management systems polycentric in different ways (Huitema et al., 2009).

The argument for a central role of government in resource management, as advanced by polycentricity, has been identified and emphasised since the conception of community-based management. It has been established that community-based management failed when government was unable to provide manuals and trained community level personnel, but successful where government committed resources to develop the skills of community level staff (Rondinelli, 1991). Many water facilities were non-functional in the 1980s because of a lack of continuous government oversight and NGOs’ post-construction support (Karikari, 1996). More recently, it has been argued that investing in expensive water projects for the rural poor without post-construction support presents challenges (Wendy and Bakalian, 2009, Lockwood, 2004, Moriarty et al., 2013). Even in developed countries, the role of central government in

water governance was recognised and advocated by several organisations after a fragmented water governance regime (Bakker and Cook, 2011). For example, in infrastructure management, Brown et al. (2012) acknowledged the central role of government in shaping the action arena rules, because the state determines the general institutional environment for actors' interaction.

Governments and NGOs still have a critical role in local (decentralised) water management to ensure that community level actors assume responsibility of accounting for their stewardship (Laban, 2007, Mansbridge, 2014). It is advanced that community-based management needs to be regularly monitored and supported by government (shared governance) and all actors need to be well-informed about management issues to ensure progressive and efficient water management (Jiménez and Pérez-Foguet, 2010, Saravanan, 2008, Opare, 2011). Opare's research demonstrated the need for such a shared form of governance. He established that CBWM is possible with complex water systems when communities are committed, there is well-informed information sharing, capacity building is provided, and regularly monitored by public agencies (Opare, 2011).

The preceding literature review demonstrates the significance of the interconnectivity of actors in resource management and the need for a facilitative body (regulatory functions of government) in the process. Managing resources with such an approach has several outcomes that are beneficial, despite the challenges that come with it. This makes it necessary to examine the outcomes of polycentric approach in the literature, and subsequently how a particular institutional arrangement takes into consideration polycentric governance and its implementation thereof.

3.3.2 Outcomes of a polycentric approach to resource management

Studies have shown that a polycentric approach to resource management has yielded beneficial results. For instance, in Namibia, the success of a decentralised water management was partly because the state retained some degree of control and assumed the role of a facilitator, while operational and monitoring functions have been largely devolved to the local level (Neef, 2009 , Falk et al., 2009). In Uganda, it was found that the success of the water sector was attributed to government support. This was not limited to investment, but the ability of service providers to take politically sensitive actions such as disconnecting defaulters, and tariff rationalisation, which made sure that tariffs were able to cover operation and maintenance cost (Schwartz, 2008). In Kenya, conflict between two clans of a community affected the management of water supply and it took the intervention of the district administration, who served as a mediator, to resolve the conflict (Schouten and Moriarty, 2003). This further explains the need for a nested system of governance, where a regulatory body can oversee CBWM. A polycentric approach to resource management is potentially resilient because the

higher-level actors are expected to complement the lower level ones, thus reducing vulnerability of the resource (Huitema et al., 2009).

The presence of nested levels of actors and the linkages between them can actually enhance adaptive capacity by pulling knowledge from the nested levels and making actors able to respond to changes (Berkes and Ross, 2013, Ebbin, 2009). For instance, in Kenya, a study on pastoral communities' adaptive capacity to global changes found that, where community level capacity was weak in dealing with changes, they relied on higher levels for learning and resilience building (Robinson and Berkes, 2011). In West Bengal, De (2009) found that decentralised water services were efficient with local government facilitation of management. Similarly, in Ghana, regular auditing of water systems carried out by local government was found to be useful in improving financial administration. That is, while the operational levels are assiduously managing their revenue, auditing services by the District Assemblies were found to have contributed to sound financial standing of the water systems (Opare, 2011).

Achieving the benefits of polycentricity, especially for nested institutional arrangements, requires coordination, which can be constrained by free-riding and limited capacity, especially funding (see, for example, Huitema et al., 2009, Madrigal et al., 2011, Jiménez and Pérez-Foguet, 2010). However, limited funding as a constraint to weak coordination has been criticised. For example, Mehta (2014) argues that it is short-sighted of governments to use lack of financial resources as an excuse for not delivering their water mandate, because water remains significant for the poor in maintaining a minimum healthy life. She further argues that investment in water is a matter of priority because a 1% cut in the military budget can finance the deficit in the water sector (Mehta, 2014). Despite this argument, recognising these challenges is important in shaping resource management analysis and drawing the policy implications.

The drivers discussed so far have had significant influence on CBWM in different dimensions and the nature of these drivers raises questions on the institutional arrangements in place to regulate these drivers. Additionally, in relation to these drivers, the discussions on polycentricity demonstrate that the nature of institutional arrangements plays a role in mitigating them.

3.3.3 The significance of institutions in resource management

"In terms of policy prescription, we have moved beyond the mentality of 'getting the prices right' to 'getting the property rights right,' and now the answer is 'getting institutions right"
(Williamson, 1994, cited in Saleth and Dinar 2004:23) .

The above quotation suggests the importance of institutions within the development arena. Institutions and their arrangements play a significant role in determining the efficacy of policies, reforms and innovations (Barrett et al., 2005). Specifically in the water sector, it suggests that,

beyond the physical differences among water organisations, it is the configuration of institutions and their enforcement that explains the differences in performance of water organisations (Madrigal et al., 2011).

Since institutions are the core component of the governance structure, different institutions and their enforcement can lead to different outcomes in water resource management (see Ostrom and Basurto, 2011, Saleth and Dinar, 2004). In Indonesia, lack of community level committees to enforce rules on water management led to water systems failure (Isham and Kahkonen, 2002a). Mugabi and Njiru (2006) observed that in Tanzania the legal provisions that clearly define responsibility and authority to local levels are able to reinforce a decentralisation policy because local management structures are backed by the institutional arrangement to choose their own management strategies to manage their water systems. Likewise, in parts of Tanzania, lack of appropriate institutional arrangements at the district level have been identified as the main trigger of sustainability challenges of the water sector (Jiménez and Pérez-Foguet, 2010). This means that within the same country, different outcomes are possible depending on the institutional enforcement in place.

It is argued that a good blend of formal and informal institutions to serve a complementary purpose is what will likely produce good results in water management (Tortajada, 2010b, Pahl-Wostl, 2009, Neef, 2009, Falk et al., 2009). For example, in Namibia, successful polycentric rural water management was strongly influenced by interaction between formal and informal institutions (Neef, 2009, Falk et al., 2009). That is, positive results of water reforms were attributed to the polycentric system of governance in which community-specific design of formal institutional arrangements recognised and took into consideration the existing informal (customary) water management rules, thus, facilitating enforcement of water management rules (Falk et al., 2009). In contrast, in the absence of interaction, mostly caused by power struggle, the performance of community-based management will be compromised. For instance, based on a review of empirical literature, Ballet et al. (2007) established that in rural Madagascar power struggle within heterogeneous social structures affected community-based management of forest and irrigation systems and in relation to that migrants were accused of wilfully breaking norms and values, thus causing environmental degradation. However, Ballet et al. (2007) argues that migrants' issues are less significant in environmental degradation as compared to distribution of powers within communities, suggesting that the institutional arrangement did not recognise the embedded powers struggles within the communities.

Similarly, in Bekwai (Ghana), Eguavoen and Youkhana (2008) identified that the structured powers and intrusion of traditional authority in CBWM adversely affected performance. Accordingly, local elites willingly occupied central positions inside the WSMT in order to "abide their influence on the management of water and stress on their privileges" (Eguavoen and

Youkhana, 2008:12). This affected accountability, transparency and decision-making about the water system. The chiefs determined the locations of public stand-posts, undoubtedly for the stand-posts to be closer to their households. This has affected the smooth operations of the water system. Additionally, in Honduras and Uganda, it was found that in communities in which there were no water committees, the water systems were managed by traditional leaders and in such cases CBWM was ineffective: leaders located the water systems to favour their families, thus "excluding other residents from using the services" (Sara and Katz, 1997). To salvage the situation in Bekwai, there was a change in institutional arrangements, where a private company with operational staff (outside the traditional area and even the region), who were not involved in the existing power struggle, was contracted to manage the water system and that is yielding good management results (Eguavoen and Youkhana, 2008).

There are instances where actors know what is expected of them based on the institution (rules) regulating their actions, but they are unable to execute them because of an entrenched mismatch between rules and capabilities (March and Olsen, 2004). Despite the difficulties in changing such an entrenched institutional (negative) behaviour, a change is necessary for enforcing institutional compliance and getting positive management results. For example, in managing water revenue loss, senior officers of Phnom Penh Water Authority, who hitherto did not pay water bills, had meters installed and were compelled by the higher government officials to pay their bills or have their water services disconnected as other citizens (Biswas and Tortajada, 2010). A change in such a negative practice, enforced by the relevant state agencies, resulted in positive financial standing of the water sector which made Phnom Penh an outstanding example of good water governance (Biswas and Tortajada, 2010).

In relation to revenue generation from water, apparent water losses[9] in developing countries have been attributed to institutional and management issues; mainly corruption, fraudulent activities of management staff in respect of billing and illegal connection by customers (Gonzalez-Gomez et al., 2011, Rouse, 2013). It is argued that the extent to which local level actors are able to interact and collaborate with actors who are external to their jurisdiction/community (Andersson and Ostrom, 2008) contributes to rules enforcement. For example, it was established that high performing water organisations enforced their rules while low performing ones did not (Madrigal et al., 2011). These empirics support the earlier position of scholars that getting the institutions right and also enforcing them are imperative if progress is to be made in resource management and policy efficacies (Barrett et al., 2005, Saleth and Dinar, 2004, Williamson, 1994).

[9] Apparent water losses are associated with unauthorized consumption and metering inaccuracies (Gonzalez-Gomez et al., 2011:347).

3.4 Conclusion

The CBWM approach was initially theorised as the panacea for problems with the water sector, but experience from several countries showed that there is more to CBWM because, as this chapter demonstrates, there are factors that influence the functioning of the CBWM approach. Specifically, it has been established that CBWM requires: user participation in the decision-making process; downward accountability (financial resources in particular) to resource users; technical capacity of local official or local officials' ability to access technical services; and reliable financial resources that can be generated at the local level. Addressing these factors requires the collaborative efforts of actors, including government, which provides incentives and sanctions where necessary. Thus, a polycentric system of water management takes into account the facilitative role of government and other actors.

In a study of this nature, which involves several actors, it is important to understand their relationship and how it is regulated because the presence of many actors can create tensions in resource management, and an appropriate institutional arrangement can minimise that by defining the mode of interaction among the actors (Villamayor-Tomas et al., 2015). Thus, the structure and argument of a polycentric approach to resource management make it necessary to analyse the institutional arrangements for CBWM and their implementation. Such a holistic research enables an understanding of the management of water systems and how performance outcomes emerge. A precise theoretical and analytical framework needs to be established to aid the study of CBWM in small towns in Ghana. Therefore, analysing the performance of a water system, and specifically the nature of its institutional arrangements, requires a critical theoretical framework that can carefully examine how various actors interact and how these important factors (discussed in section 3.2) have been integrated into the institutionalisation of CBWM. Therefore, this study takes an institutional approach using the institutional analysis and development framework to examine how actors in CBWM interact to produce outcomes.

4 Theoretical and analytical framework

4.1 Introduction

This chapter presents the theoretical and analytical framework for analysing community-based water management (CBWM) in small towns. It links the preceding chapters with the methodology chapter (next chapter). Thus, the framework gives the researcher a sense of direction in approaching the research phenomenon holistically in terms of data collection and analysis. This study takes an institutional approach, using the institutional analysis and development (IAD) framework. The rest of the chapter is divided into four main sections. Section 4.2 discusses the concept of institution and specifically Scott's institutional framework. Although other researchers (see, for example, Eguavoen, 2007, Livingston, 2008) have applied Scott's framework in the study of water management, it does not critically examine interactions and linking the interactions to outcomes, which is the focus of this study. In order to achieve the research aim, an appropriate framework (IAD) is applied. This leads to section 4.3, which details out the IAD framework, its attributes, and how it has been applied in different fields of research. The IAD framework serves as a heuristic tool in analysing CBWM in terms of how institutions facilitate or constrain interaction among actors in ensuring functional water systems in small towns. Based on the attributes of the IAD framework, section 4.4 presents my analytical framework for the study, specifying the main variables of the study and the relationships among them.

4.2 The concept of institutions

The term institution has been used almost loosely and applied in various fields of study including: North (1990) in the study of economic development and political science; Powell and DiMaggio (1991) in organisational study; Ostrom (1992) in resource management; and in sociological studies (Scott, 2008). Scholars (see Ostrom, 1992, North, 1990) have observed that in the development literature, the term institution is used interchangeably with organisation. In fact, the use of the term "institution" in basic parlance is often confused with the term "organisation". The varied application of the term "institution" also prompted Sjostrand (1993:9) to ask whether an institution is an organisation or a system of rules, and whether it is formal or informal? In relation to these questions, several but related explanations have been given to the concept.

North (1991:97) conceptualised institutions as "humanly devised constraints that structure political, economic and social interaction". They are made up of both informal constraints and formal rules. Informal constraints or rules include sanctions, taboos, customs, traditions and codes of conduct, whereas formal rules include constitutions, laws and property rights (North, 1991:97). "Organisations" are political, economic and social bodies. They are a group of "individuals bound by some common purpose to achieve objectives" (North 1990:5). Kiser and

Ostrom (2000:66) referred to organisations as “composites of participants following rules governing activities and transactions to realise particular outcomes”.

For Meyer et al. (1994:24) informal rules can be described as “cultural accounts” within which human actions take place. This means that in every society, institutions explain what that society represents, by delineating what can be done and what cannot be done. Informal institutions are embedded in society, and are seen as the building blocks of formal institutions because they emerge from interactions that occur within the society (Meyer and Rowan, 2006, Kim, 2005, Williamson, 2000), implying that we have informal and formal institutions. North’s concept of informal institutions aligns itself to culture. Intrinsically, the formal rules can change, perhaps due to political or policy directives, but informal rules are socially embedded and remain relatively difficult to amend (Saleth and Dinar, 2000, North, 1990, Behera and Engel, 2006, Williamson, 2000, Kim, 2005).

It is actually the combination of the informal and formal institutions that shape socio-economic development (Behera and Engel, 2006, North, 1990). As nations develop, with increasing uncertainty, both types of institutions are required to minimise the uncertainty by establishing a pattern of human interaction (Saleth and Dinar, 2004). It is also argued that in local level development issues, formal institutions should rely on informal ones, as this will create coherence (Balint et al., 2002, Saleth and Dinar, 1999). After several years of practice and acceptance, the informal institutions become “rules in their own right” and the potential to influence the formal ones is high (Sokile et al., 2003:1020). This may not hold in all situations because some informal rules conflict with the formal rules, especially in resource management. In such situations, the formal rules can be modified to create consistency, as demonstrated in section 3.3.3 above on the role of institutions.

From a resource governance perspective, Ostrom (1992:19) referred to an institution as “the set of rules actually used (the working rules or rules-in-use) set by an individual to organise repetitive activities that produce outcomes affecting those individuals and potentially affecting others”. The central theme of her definition is “working rules or rules-in-use”, whose absence will not produce the desired outcomes. Thus, working rules are the set of rules to which participants would make reference if asked to “explain and justify their actions to fellow participants” (Ostrom, 2011:18). Once rules regulate a number of actors, especially in resource management, this makes them shared prescriptions that are mutually understood and enforced by a set of participants to order repetitive, interdependent relationships (Ostrom, 1986, Ostrom, 2007). That is, based on a set of rules, stakeholders associate particular action with specific situations (March and Olsen, 1989, Ostrom and Basurto, 2011).

Thus, institutions are necessary to shape the pattern of human interaction, and the outcomes thereof, by creating incentives (individuals' perception of the outcomes that emerge from their action or inaction within the rules), and regulating the tendency of overexploitation of resources (Ostrom, 1992, Ostrom and Basurto, 2011, Ostrom, 2012, Ostrom, 2005). Sources of incentives include the value that individuals attach to the outcomes and the cultural values within the community (Behera and Engel, 2006, Ostrom, 1992). The essence of the rules is to ensure order, and they specifically indicate the steps to be followed under certain circumstances. Once the procedures are internalised, they are followed, even when it is not in the narrow self-interest of the person responsible to do so (Ostrom, 2011, March and Olsen, 1989, March and Olsen, 2004, Kiser and Ostrom, 2000), and encourage desired outcomes to emerge for the collective good.

From the discussion on institutions, it is inferred that rules are always designed by society to regulate behaviour and this requires actors to enforce the rules. According to North (1990), institutions are the "rules of the game" and organisations are the "players of the game". Characteristically, institutions include both organisations and the rules used to structure patterns of interaction within and across organisations (Ostrom, 2007). An organization is composed of "individuals who, being bounded by a common purpose within an institutional framework, form a body of suits" (Kim, 2005:487). The organisation in this case distributes rewards and perhaps clearly establishes behavioural guidelines (Koelble, 1995). Essentially, organisations (players of the game) do not just participate in the "game" but they seek to use strategies to harmonise resources in order to achieve results within the "game" (Kim, 2005, North, 1990). Therefore, the organisations and the institutions are interlinked in a particular resource system.

4.2.1 Institutional elements: Scott's framework of institutional analysis

From a sociological perspective, Scott conceptualised institutions in a way that tends to encapsulate the various views that have been expressed above. For him, an institution "comprises regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" (Scott, 2008:48). From Scott's concept, the end result or the overall expectation of an institution is to create stability in society, as equally noted by North (1991), although stability may not always result in efficiency. While Scott stressed the importance of these elements in institutional analysis, anthropologists view the cultural-cognitive pillar as central to institutions because for them institutions are social structures (see Eguavoen, 2008).

The central point (rule) which cuts across the definitions (North, 1991, Ostrom, 1992, North, 1990), rests on Scott's regulative element. The regulative element entails the establishment and expected conformity to rules and laws, with sanctions, as a way of influencing behaviour.

That is, due to self-interest there is the tendency for non-compliance of rules and when it occurs, the mechanism required to control behaviour is coercion. This highlights the central role of the state as a referee to avert powerful actors using threat to inflict their self-interest on others (Scott, 2008:52-53). The second, normative element, stresses values (the preferred or the desirable state), and norms: it defines goals and objectives in an organisation and the means (strategies) of achieving them. Values and norms are context-specific and prescriptive (i.e. they shape how an individual should behave). They are internalised and form the basis of social order because of the moral connotation attached to them (Scott, 2008:54-56). The cultural-cognitive element is central to organisational studies. It emphasises the symbols and meaning that arise from interaction to help interpret behaviour. This element allows the analyst to consider both the actor's objective and subjective interpretation of certain actions. The element argues that internal understanding of processes is influenced by external cultural frameworks (Scott, 2008:57-58).

The regulative, normative and cultural-cognitive elements have their implications in the water sector and have been applied in water management. Livingston (2008) applied Scott's framework of institutional analysis to examine institutional barriers and enablers in a decentralised water system in Australia. According to Livingston (2008), the regulative element creates uniformity in water management issues. That is, the regulatory element controls behaviours of actors involved in a particular water resource management, such as determining access to water. For example, the Australian Drinking Water Guidelines set the performance guidelines for water authorities (Livingston, 2008). Similarly, in Ghana, the Project Implementation Manual and the L.I 2007 regulate actors in the rural and small town water sector (CWSA, 2011, CWSA, 2014d). The cultural-cognitive element is tilted toward anthropology and its application has been extended to natural resource management because the conventional understanding of institutions sometimes tends to overlook day-to-day social events (see Mehta et al., 1999, Eguavoen, 2008, Cleaver and Franks, 2005, Ferragina et al., 2002). Conceptually, institutions need to be linked to knowledge (what people know and believe) and power, because institutions, especially those concerned with natural resource management, can reinforce existing powers and social relations (Mehta et al., 1999, Eguavoen, 2008, Eguavoen, 2007).

From the discussion, it is concluded that rules of the game and the players of the game (North, 1990) are inseparable in the sense that, players (organisations) without the rules will result in chaos and the desired outcomes may never be realised. Again, with rules, the diverse interests (sometimes personal) of stakeholders, which often emerge during decision-making are minimised. That is, rules guide against defection by individuals and provide sanctions for non-cooperative behaviour (Koelble, 1995, March and Olsen, 2004). Institutions are conceived more broadly than organisations, primarily because they set the rules and define what the

players (organisations) can and cannot do within a given context. Therefore, it is better to consider both institutions and organisations in the analysis of CBWM. In the following study, the players (organisations) are identified as the units of analysis and therefore help to explain how institutions (formal/informal rules) interact to influence outcomes. Moreover, the formal rules also exhibit some level of stability and tend to be similar across geographical regions (Saleth and Dinar, 1999, Saleth and Dinar, 2004), which is subjected to case-based comparison.

Given the significance of institutions in regulating actors, it is important to apply an appropriate framework that can critically analyse how actors interact according to rules in a given resource regime and produce outcomes. As long as institutions entail a combination of rules (Ostrom, 2005, North, 1990), it is appropriate to deconstruct them in terms of their arrangements and functions (Saleth and Dinar, 2004). For the purpose of this study, organising institutional arrangements into rule categories for empirical analysis can help explain performance outcomes (successes or failures). Although Scott's framework for institutional analysis is relevant for explaining the "pillars of institutions", which has been applied in water management, his framework does not provide enough consideration of interactions among organisations (actors) and how their interactions are linked to outcomes. As a result, the institutional analysis and development framework (IAD) is adapted for the purposes of the following study of CBWM in small towns. The principal concern of institutional analysis is the concept of "rule" as the basis of individual actions and inactions (Ostrom, 2005). Therefore, it is imperative for institutional analysts to go beyond the surface (outcomes) and probe deeper into the rules that actors in a particular situation create and follow (Ostrom, 2005).

4.3 The Institutional Analysis and Development framework

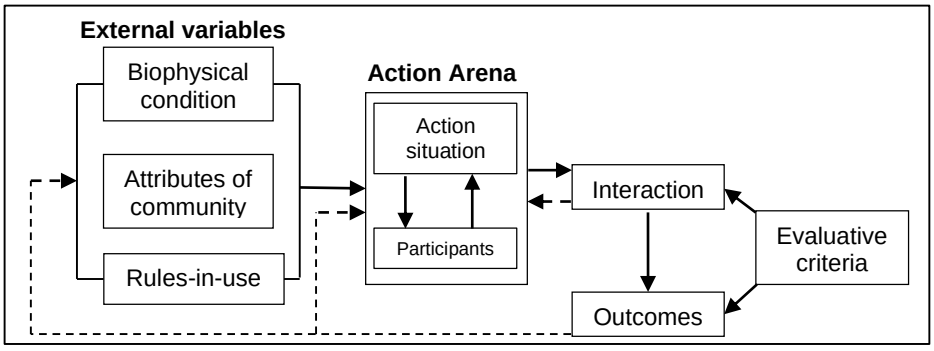
Institutional arrangements[10] can be complex and involve several variables. As such, in order to maintain detailed analysis of institutional arrangements, it is important to focus on a manageable set of variables and this can be done by devising a framework that allows a systematic collection and analysis of data (Imperial and Yandle, 2005). One such framework is the Institutional Analysis and Development (IAD) framework. The IAD framework is a multidisciplinary research framework that is especially applied to the institutional analysis of resource management, and involves several actors at multiple levels and functions (Ostrom, 2005, Ostrom, 2011, McGinnis, 2011). It takes into account the characteristics of polycentric governance (Nunan, 2015).

Using the IAD framework involves an identification of a conceptual unit (action situation) where the actors interact to potentially produce outcomes (Ostrom, 2005, Ostrom, 2011, Rahman et

[10] Institutional arrangements are the "set of rules governing the number of decision makers, allowable actions and strategies, authorised results, transformations internal to decision situations, and linkages among decision situations" (Kiser and Ostrom 2000:65).

al., 2012). According to the IAD framework, actors interact using rules in decision-making in order to manage resources (Saravanan, 2008, Ostrom, 2011, Ostrom and Basurto, 2011) (see Figure 4.1). Thus, the IAD framework is applied to understand institutional arrangements and interaction in natural resource management (Ostrom, 2005, Nunan, 2015). This section explains the components of the IAD framework and, consequently, how it has been applied in different fields of work. As shown in Figure 4.1, the framework comprises "a set of external variables which influence the action arena and the action arena feeds into patterns of interactions, leading to outcomes. The evaluation criteria can be used to assess the performance of the institutions, process and system" (Nunan, 2015:70).

Figure 4.1 The Institutional Analysis and Development framework



Source: Ostrom (2005).

Action Arena: The action arena is made up of the action situation and the participants of the situation (see Figure 4.1). The action arena occurs at different levels, ranging from the household level to the international level of organisation (Ostrom, 2005). The action situation is the "social space where participants interact, exchange goods and services, solve problems and/or dominate one another" (Ostrom, 2005:14). This social space is often the focal unit of analysis and can include: fisheries (Imperial and Yandle, 2005); forestry (Clement, 2010, Andersson, 2006, Fischer et al., 2004); and common pool resources and ecosystems (Imperial, 1999, Ostrom, 1995). The "participants" in a situation are the decision-making bodies, and they can include corporate bodies, individuals, nations, and NGOs (Ostrom, 1995, Ostrom, 2005). As these two (participants and action situation) interact, they are affected by external variables (the biophysical, the attributes of the community and the rules-in-use) and produce outcomes that in turn affect the action arena and the external variables (Ostrom, 2005), as shown in Figure 4.1.

The biophysical condition: The action arena is affected by the types of goods and services, in terms of subtractability (rivalry of consumption) and excludability (feasibility of controlling its access), which are available to a particular setting (see, for example, Ostrom, 2005, Fischer et al., 2004). The level of excludability and subtractability also depends on the ownership structure of the resource, that is, whether they are private, public or common pool resources (Ostrom, 2005). For instance, the benefits from common pool resources such as forestry and

fisheries are difficult to exclude others but the extraction of “units” from the resource by one user of the resource limits the amount available for other users (Ostrom, 1995, Ostrom, 2005).

Attributes of the community: These include: norms of behaviour; size and composition of the community; the level of inequality within the community; distribution of resources; political and socio-economic factors; the level of homogeneity of preferences and common understanding within the community; trust that members of the resource system have about other members willingness to work with the rules; level of cooperation (reciprocity); and the level of social capital (see Imperial and Yandle, 2005, Ostrom, 2005, Nunan, 2015). These factors affect the action arenas, especially in community-based natural resources management, in various forms, as demonstrated in section 3.2 in the preceding chapter.

Rules-in-use: According to Ostrom (2005), the term “rule” is central to institutional analysis. There are three levels of rules that affect the action arena. These are the: (i) operational rules, which directly affect day-to-day decisions made by the participants in a setting, and such rules can be changed rapidly; (ii) collective-choice rules, which affect the operational level activities and results and such rules change slowly; and constitutional-choice rules, which first affect the collective-choice rules and, subsequently, the operational rules (Ostrom, 2005, Ostrom, 1995). The rules provide information about the action an actor “must” perform (obligation), “must not” perform (prohibition), or “may” perform (permission) if they are to avoid the possibility of sanctions being imposed (Ostrom, 1995:15).

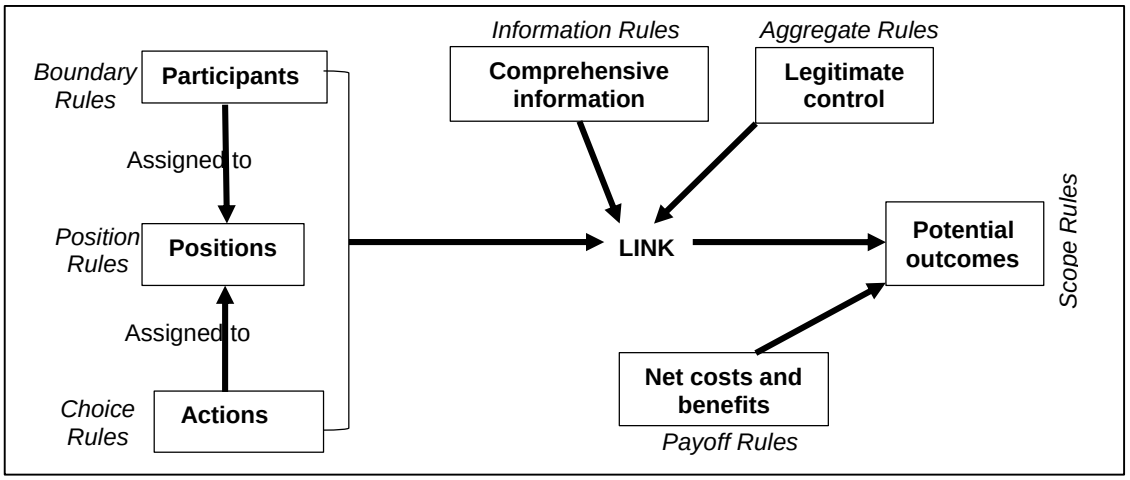
Outcomes and evaluation criteria: The outcomes are the results of the action situation and the external variables (Ostrom, 2005). The evaluation criteria is used to measure the “performance of the systems by examining the pattern of interactions and outcomes” (Ostrom, 2005:13). Such an evaluation can be done using different criteria: (i) efficiency, as in how resources, such as financial, are used; (ii) equity, the manner in which outcomes and processes are distributed; (iii) accountability of resource management structures to the users and other actors; (iv) participation in terms of who is involved in the action situation; and (v) adaptability, in terms of how individuals adapt to new circumstances as they arise, and the ability of the system to go through disturbance and continue to function without losing its structural integrity (Andersson, 2006, Ostrom, 2005, Nunan, 2015). As shown in Figure 4.1, the outcomes feedback to the action arenas. Such feedback can lead to a transformation of the action arena. Similarly, the outcomes can provide feedback to the external variables and and so lead to modification of them (Ostrom, 2005). For example, the framework is used to support a results-based approach to project and programme planning, and to evaluate projects implemented by GTZ and the results feed into subsequent planning. This takes into consideration the effects of the external variables on the action arena. One effect of the feedback was capacity building of the participants of the situation (forestry) (Fischer et al.,

2004, Fischer et al., 2007). The action situation is further characterised by seven variables that are discussed in the subsequent sections.

4.3.1 Characterisation of variables and rules-in-use of the action situation

The action situation is linked to a set of seven variables. Human interaction is made up of "*actors* in *positions* choosing among *actions* at particular stages of a decision process in light of their *control* over a choice node, the *information* they have, the *outcomes* that are likely, and the *benefits and costs* they perceive for these outcomes" (Ostrom and Basurto, 2011:323). Rules, which form the basis of cooperation or competition, have also been classified into seven working parts (Ostrom, 2005). These include: (i) a set of actors (bound by boundary rules); (ii) the available positions to be filled by the actors (bound by position rules); (iii) the actions that are allowed (choice rules); (iv) the outcomes that are linked to the activities (scope rules); (v) the level of control that actors have over the choice in a situation (aggregate rules); (vi) comprehensive information available about the situation (information rules); and (vii) the net benefits and costs (payoff rules) that are associated with outcomes (Ostrom, 2011, Ostrom, 2005). Specifically, in water management, it is the “bundle of rules-in-use” (see Figure 4.2 and Table 4.1) that defines how actors enter the positions available for them to assume, and what they can do or cannot do within the action situation (Saravanan, 2008, Ostrom and Basurto, 2011).

Figure 4.2 Internal structure of an action situation



Source: Ostrom (2005).

Table 4.1 Ostrom's seven general rule categories

Rule Type	Summary of Description
Position Rules	• Define the positions and their composition/membership. • These rules could be rotational in nature.
Boundary Rules	• Define entry and exit criteria and procedures. • Rules on occupying multiple positions. • Boundary rules may relate to membership of a particular resource.
Choice Rules	• Specify what a participant occupying a position must, must not, or may do at a particular point in a decision process, and what informs the selection. • Focus on role casting among organisations and individual members.
Aggregate Rules	• How decisions are made before an action is taken (who is to decide which action or set of activities is to be undertaken).
Information Rules	• Channels used to communicate different information and the rules spelling out the frequency. • They are important in generating information about past action and are useful in determining trustworthiness of actors.
Pay-off Rules	• Assign external rewards or sanctions (benefits and costs assigned to actors) based on outcomes of particular actions.
Scoping Rules	• Define limits on use of water obtained from a system. • Which outcomes should be affected by a particular situation?

Source: Constructed from Ostrom (2005) and Ostrom and Basurto (2011)

These seven categories (see Table 4.1) can serve as the basis for analysing institutions within the water sector. In a formal action situation, as it is with CBWM, it is assumed that each "participant will have complete information about the other participants, the position they hold, the action available to them (i.e. their functions), the outcomes of the action situation, the information available to all of them and the payoff involved" (Ostrom, 2005:50). The information about a particular situation can be perfect or imperfect. In CBWM, rules can be effectively enforced where actors, especially resource users, have adequate information and knowledge of the rules. For example, Madrigal et al. (2011) found that due to community members' knowledge of choice rules and the boundary rules in water management, they are able to use formal procedures to remove members of the water association in the event of dissatisfaction of their performance. A similar relationship between knowledge of rules and enforcement by users were established by other scholars including; Opare (2011), Ostrom and Basurto (2011) and Schouten and Moriarty (2003). Although participants are expected to have adequate information about the action situation (Ostrom, 2005), in many cases the incentives that each participant expects or the motive behind a participant assuming a particular position may not be known to other participants. In other words, there are personal reasons for assuming certain positions in community-based resource management. In most instances, actors will want to achieve personal goals and then goals of the entity (McGinnis and Ostrom, 2014), and this is common with community-based resource management.

It is argued that the Water and Sanitation Management Teams at the community levels are mostly voluntary organisations and members volunteer to participate (Schouten and Moriarty, 2003, Harvey and Reed, 2004, Moriarty et al., 2013). Expectedly, if individuals *volunteer* to participate, then they share some sense that the rules governing their actions are appropriate (Ostrom, 2005). This argument does not apply in all situations. There are instances where participants volunteer because of perceived benefits (opportunities) they will derive at the end. The benefits and costs assigned to outcomes are motivational to an action situation (Ostrom, 2005), especially in community-based resource management systems that are purported to be voluntary.

Behaviour is also shaped by the choice rules (what one can do or cannot do in a particular situation) (Ostrom, 2005), and how an individual weighs the payoff or the consequences (sanctions) of a particular behaviour. That is, behaviour is shaped by existing graduated sanctions. According to Ostrom (2005), when the sanctions applied for breaking a rule is too low, it does not deter individuals. This is particularly relevant where the benefits to the individual outweigh the cost he/she bears for rule breaking. Even where the graduated sanctions are "heightened", they can only produce effective outcomes if they are enforced. However, it is argued that enforcement is often not perfect, and thus gives way for opportunism[11] to thrive (North, 1990). This is common in collective action, where it is difficult to assign outcomes to particular individuals. In such situations, there is the tendency for individuals to exhibit opportunistic behaviours, which can lead to certain outcomes (Ostrom, 1995, North, 1990). Nonetheless, in collective resource management, outcomes (successes and failures) are not attributed to individuals but should be taken as a collective responsibility (Innes and Booher, 2000).

4.3.2 Application of the IAD framework

The IAD framework has been used in several disciplines, especially in natural resource management and proved useful in understanding how various components interact within a set of rules to produce outcomes. These include the study of: urban water systems in Australia (Bettini and Brown, 2011); irrigation systems management in Nepal (Ostrom and Basurto, 2011) and Himachal, India (Saravanan, 2008); ecosystem and fisheries management (Imperial, 1999, McGinnis and Ostrom, 2014), and forest governance (Andersson, 2006, Clement, 2010, Fischer et al., 2004). For instance, the IAD framework enabled Imperial (1999) to conclude that, it is important to closely examine institutional arrangements and performance to be able to inform sound policy direction. He observed that efficient ecosystem management hinges on institutional design: that is, getting a right balance between formal and informal institutions,

[11] The term "opportunism" is used to explain a situation where a "participant deceits in order to improve one's own welfare at the expense of others" (Ostrom, 2005;51).

because the rules are dependent such that knowledge and application of one rule influences other rules (Imperial, 1999).

For instance, with reference to water management, the scope rules relate to outcome and depend on the availability of information, aggregate and pay-off rules and their efficacy (Saravanan, 2008). In an analysis of urban water systems, it was found that limited provision in scope, choice and pay-off rules stifled management innovation and this contributed to loss of efficiency (Bettini and Brown, 2011). On the other hand, Bettini and Brown established that the use of Ostrom's working rules produced efficient results in promoting adaptive capacity in water supply in Australia, through feedbacks of outcomes to the action arena. This was manifested in the diversification of water from a great reliance on ground water to desalination, treatment and inter-regional transfer (Bettini and Brown, 2011). Additionally, active adherence to pay-off-rules is often the positive turning point of efficient service delivery. For example, in Phnom Penh (Cambodia), a strict compliance to water sector restructuring ensured effective management. Staff salaries were increased with bonuses for good performance while corrupt staff were sacked and other unacceptable behaviour was sanctioned (Rouse, 2013, Biswas and Tortajada, 2010).

In Bolivia, Andersson (2006) used the IAD framework to examine the institutional conditions that favour effective decentralised forest governance and the manner in which they relate to sustainability of the forest. Using empirical data from the forestry sector, he found that information and knowledge exchange (information rules) are key favourable factors for successful local forest governance. He categorised the information flow into three: downward (from central government to local levels); upwards (government officials learning about local conditions through meetings with local level actors); and horizontal (local level actors sharing information across different localities) (Andersson, 2006). Rules that facilitate these kinds of information flows are relevant to resource management. The framework has been extended to project planning and evaluation by development cooperation (Fischer et al., 2004). In project planning and evaluation, Fischer et al. (2004) used IAD framework to examine how individual behaviours led to problems in natural resource management (outcomes) and the incentives that stimulate behaviour. For instance, in Asia, they established that overexploitation of forest resources was facilitated by "lack of accountability of the strong actors, non-compliance with existing laws, and lack of education and trust in the general public" (Fischer et al., 2004:134).

The IAD framework has also been applied to analyse forest governance in Vietnam (see Clement, 2010), where Clement argues that the IAD framework does not adequately take into account how the role of interest and "power distribution at each governance level and between different levels affects rule crafting and transformation of rules into actual practices" (Clement, 2010:139). According to her, power goes beyond the capacity of an actor to influence a target,

to include daily enforcement of social and political practices (Clement, 2010). As such, it is important to examine how power and interest, which are embedded within the politico-economic contexts and discourses, affect institutional arrangements. Hence, she added politico-economic context and discourse to the existing three exogenous variables (see Figure 4.1) and used the extended version of the IAD framework to analyse a state-led afforestation programme (Five Million Hectare Reforestation Programme) in the northern mountain region of Vietnam. She established that the framework is able to link and analyse multiple levels of resource governance and, consequently, analyse policy shortcomings (Clement, 2010). Her analysis revealed that policy outcomes in terms of forest cover were successful, but little was achieved in terms of environmental protection and livelihood improvement (Clement, 2010). Such an analysis shows that the IAD framework stimulates researchers to go beyond the policy outcomes to examine the implications of a particular situation, for example, reforestation, in a wider context. Despite Clements' extension of the IAD framework, one can still argue that generally the distribution of power and interest, as explained by Clement, are embedded in the attributes of the community. Nonetheless, depending on the resource in question and the extent to which power and interest are entrenched within the levels and their cascading effects, they can be *projected out* as having a strong influence on the action arena and, as such, added to the suite of exogenous variables.

In investigating the relationship between poverty and the environment, Nunan indicates that the attributes IAD framework are useful in understanding the *processes* that can lead to potential *outcomes* (livelihood outcomes) and how the affected (poor) define the outcomes. That is, it pays attention to how natural resources are governed and, consequently, concerns itself with explaining outcomes of a particular institutional arrangement in resource management. As such, the IAD framework creates a coherent structure and rationality in analysing common pool resource management (Nunan, 2015).

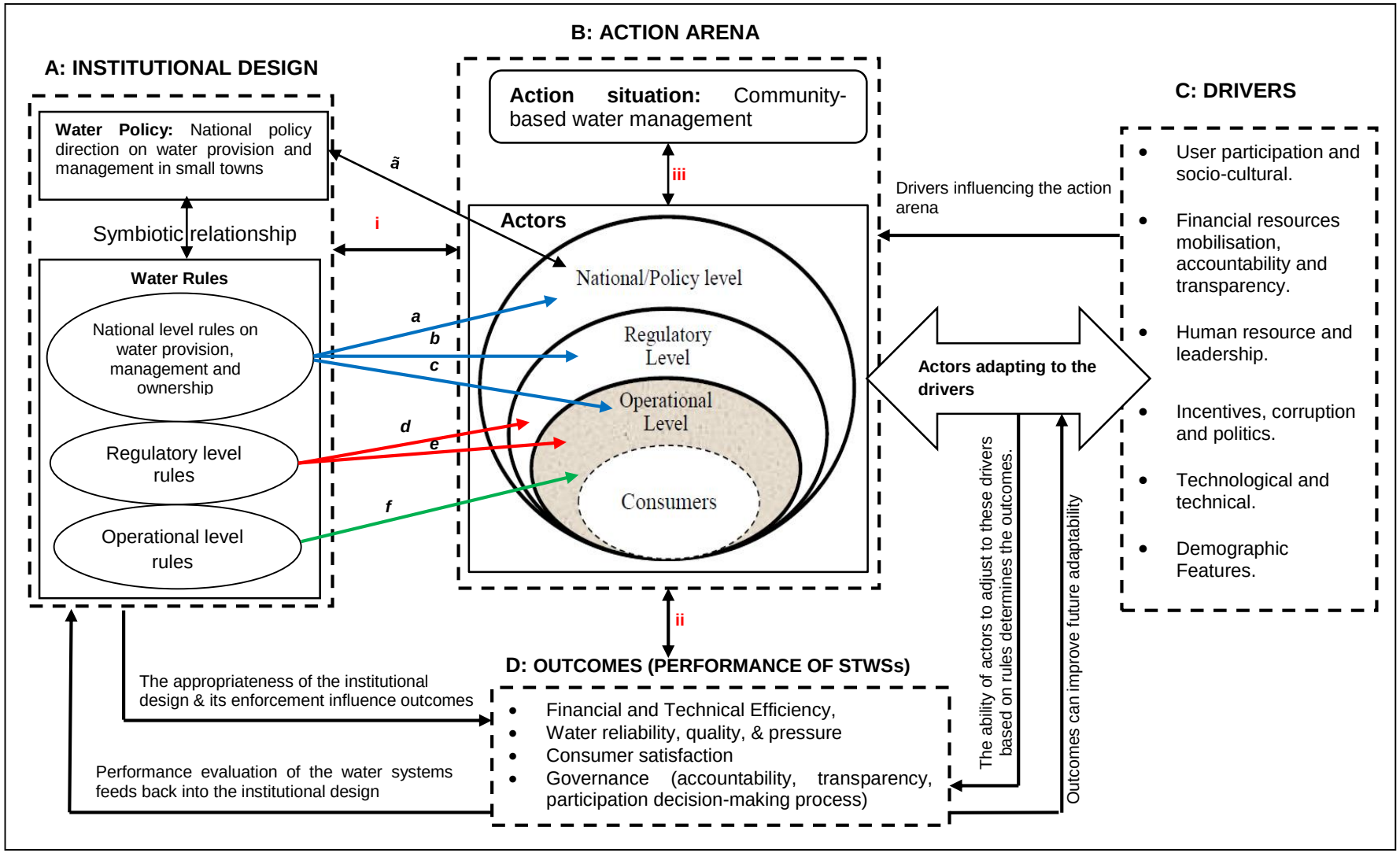
Whaley and Weatherhead (2015) applied the IAD framework to analyse co-management of farmer water abstractor groups in the low lying east of England, in which they identified factors that connect the groups to outcomes in co-management. It was established that despite the efforts to promote cooperation and participatory water governance in England, it is constrained by power dynamics, limited trust between farmers and water managers, and among farmers. As a result, one group (Lincoln Water Transfer Ltd) used a corporate strategy; formed a limited company with a comprehensive set of working rules, which granted it an independent legal status to conduct its affairs. This strategy enabled the group to overcome the power dynamics and low level of trust that has characterised farming. Based on their empirical evidence, they argue that the adoption of a corporate strategy with clearly defined enforceable institutional arrangements can minimise mistrust and power dynamics among actors (see Whaley and Weatherhead, 2015).

The discussion on the IAD framework and its application in different disciplines support the view that it is useful in explaining outcomes of a particular institutional arrangement in resource management (Nunan, 2015). Generally, it analyses how attributes of a resource system, the users and the governance structures interact to influence performance (outcomes) (Madrigal et al., 2013, Ostrom, 2005, Ostrom and Basurto, 2011). Several attributes of the IAD framework are useful for an analysis of CBWM in small towns. These attributes are: (i) the external variables; (ii) the action arenas; (iii) the working rules; and (iv) how these combine to produce outcomes. The attributes of the IAD framework are useful in approaching this study, which seeks to examine water systems' performance and the extent to which performance is influenced by the institutional arrangements. Based on the discussion on institutions and the IAD framework, section 4.4 carves out the framework for the study of CWBM in small towns.

4.4 The analytical framework of the study

This section presents the main variables of the study and the relationship among them. Drawing from the preceding discussion, four major components are discussed within the framework, namely: (A) the institutional design, which is further divided into water policy and water rule; (B) the action arena; (C) the drivers that impinge on the action arena and the adaptive capacity of the actors to proactively and reactively respond to the drivers; and (D) the outcomes (performance components of the water systems) that emerge. These main components are conceptualised in Figure 4.3.

Figure 4.3 Analytical framework of the study



Source: Author's construct, 2015

The framework starts with an understanding of the institutional design (see component A in Figure 4.3), which consists of established rules, norms, practices and policies that provide a structure to human actions related to water management (Bandaragoda, 2000, Saleth and Dinar, 2004). It is important to understand the local norms of decision-making and representation because they can minimise or enforce conflict over water management. During the early years of CBWM, it was emphasised that laws are required to cement the relationships between central government, their decentralised units and the communities, and to promote accountability among them (Evans and Appleton, 1993). It is emphasised that the process through which actors come into existence and how they evolve over time is influenced by the institutional design (North, 1990), as shown in Figure 4.3 (see line i). For the purpose of this study, the collective choice level is referred to as the *regulatory level* and the constitutional level is termed as the *national level.* Within the institutional design, rules are contained at three levels: the operational level, which guide the daily activities of actors; the regulatory level, which sets out the context for the operational level rules; and the national level, where bigger decisions and rules define the rules at the other levels, as discussed in section 4.3 above. In Ghana, due to the political and administrative authority of the intermediate level over the operational level (see Government of Ghana, 1993, CWSA, 2011), the relationship between the two levels is facilitative and regulatory in nature. That is, the intermediate level *regulates* the operational level water management activities.

The institutional design defines the action situation and the participants (actors) in the situation[12] (component B of Figure 4.3). The action situation in this study refers to the CBWM. Within a decentralised context, the actors in this situation are nested, ranging from the individual customers at the operational level through to bodies at the regulatory and the national levels. The operational level and the regulatory level are responsible for the implementation of the water rule and policy. Conversely, these actors receive their legal existence and functions from the water rules. Symbiotically, the actors also influence how the institutional design evolves (North, 1990, Saleth and Dinar, 2004), through a strong interaction between the actors and the institutional design (see arrow 'i' Figure 4.3).

Several drivers also affect the action arena (reviewed extensively in the previous chapter). As the actors interact with the action situation (CBWM) (see line iii), there are drivers (component C in Figure 4.3) that affect their interactions (Saleth and Dinar, 2004, Schouten and Moriarty, 2003, Ostrom, 2005). Drivers, according to Robinson and Berkes (2010), refer to any factors, natural or human-induced, that directly or indirectly cause a change in the system, in this case, the water system (see section 3.2). In that respect, the extent to which the institutional design

[12] In resource management, such as water, there are other participants who may not necessarily be direct *users* of the product or service and, as such, it is better to use the term 'actors' instead of users (see McGinnis and Ostrom, 2014). However, this does not mean that 'users' cannot be applied in this study. 'Users' are used in the empirical analysis to refer to the consumers of the water services.

for CBWM recognises these factors and makes provision for handling them can have implications on the water systems' performance. Furthermore, the ability and the manner in which the actors modify the institutional design (arrow 'i' in Figure 4.3) to suit a particular situation will have an effect on the outcome (see arrow 'ii' in Figure 4.3).

Therefore, the adaptive capacity of the actors to respond to these drivers determines the performance of the water systems. According to Saleth and Dinar (2004), the absence of institutional rigidity is a necessary ingredient in promoting adaptive capacity, which is also a requirement in bringing about improved water performance. That is, how the actors are able to positively manipulate the institutional arrangements to adapt to the changing drivers remain significant in producing the desired outcomes. Ostrom posits that resource management is likely to suffer when the institutional arrangements are not able to respond to the changing environment. For example, a centrally controlled irrigation system, which occasionally allocates resources for operation and maintenance, is not able to response immediately to disturbances such as flooding of the canal. However, locally controlled institutional arrangements anticipate the emergencies and put in place rules and reserve funds to respond appropriately to disturbances (Ostrom, 1995). Such responsiveness may become increasingly important in a world affected by climate change induced incidents and certainly has relevance to analysis in this research (see discussion below on adaptive capacity).

Moreover, the manner in which water rule and water policy adequately capture the tenets of CBWM has a bearing on the performance of the water sector. That is, the appropriateness of the existing water rules and policy provisions and how they are executed in water management will have impact on the performance of a given water system (Saleth and Dinar, 2004, Schouten and Moriarty, 2003, Rouse, 2013). Thus, performance can be improved through a change in institutional design (Saleth and Dinar, 2004). However, change has to be informed through feedback from a holistic evaluation of the *source* of performance concerns and the existing institutional configuration (see the linkage between component A and D in Figure 4.3). The subsequent sections explain the details of the four main components of Figure 4.3.

4.4.1 Component A: Institutional design

As shown in Figure 4.3, water policy and water rules have a reciprocal relationship, whereby water rules empower water policy and in the same vein, the water policy provides a "political economy translation for water law" (rule) (Saleth and Dinar, 1999:8). The water rules and the water policy constitute the institutional design (Saleth and Dinar, 1999, Agrawal and Perrin, 2009), which defines and influences the powers of the actors to make and implement decisions and to deliver services (Agrawal and Perrin, 2009). Although complementary in nature, the sequence of water law and water policy is not easily established and due to their mutual feedback, they remain central in any institutional analysis of the water sector (Saleth and Dinar,

1999, Shah, 2005, Saleth and Dinar, 2004) because they together fashion decision-making with water management (Saravanan, 2008). This is shown by the symbiotic relationship in component **A** in Figure 4.3 between water policy and water rules. Water rules, as shown in Figure 4.3, refer to what Scott (2008) described as the statutory-established laws as well as the socially embedded norms, but the emphasis here is on water-related rules.

The institutional design of decentralised water services delivery has implications on how other drivers come into play in the water sector. According to Mugabi and Njiru (2006), a decentralised water services delivery needs to be accompanied by clear policies, including capacity building and authority of small towns to act (raise revenue to finance operations). A clear policy that indicates government commitment to water delivery can serve as an incentive to donors and the private sector in general (Schouten and Moriarty, 2003). Whereas the water policy and water rules regulate the activities of the actors, they (actors) in turn implement the legal and policy provisions at the field level (Agrawal and Perrin, 2009, Saleth and Dinar, 1999, Saleth and Dinar, 2004).

At the operational levels, there are rules which guide the daily activities of the water systems (see green line f in Figure 4.3). The formal ones are enshrined in the constitutions and bye-laws (gazetted) of the water systems, which are in tandem with the regulatory and national level rules (see CWSA, 2011). The focus of the operational rules is to protect the interest of the resource (Edwards and Steins, 1999). It is at this level that the seven rule categorisation (Ostrom, 2005, Ostrom and Basurto, 2011) is emphasised for the purpose of this study. That is, at the operational level, actors take decisions and actual actions based on the range of choices made available to them by the collective-choice level (McGinnis and Ostrom, 2014). Unlike other resource systems (common pool resources) where the operational level rules are designed within the collective-choice rules (Ostrom, 2005, Ostrom, 1995, Edwards and Steins, 1999), in small town water systems, the operational level rules are developed based on the national level rules (CWSA, 2011). Nonetheless, it is at the collective choice level that rules concerning monitoring responsibilities are defined (McGinnis and Ostrom, 2014). The constitutional level (national level) sets the broader domain within which the collective choice (regulatory) and the operational level function (McGinnis and Ostrom, 2014). For instance, in Ghana, the national level rules on water provision, and the management and ownership structure of the water systems regulate the actions of actors at the national level, regulatory level and the operational levels (see CWSA, 2011) (see blue lines a, b and c in Figure 4.3).

With the knowledge that institutions create actors, define what is expected of them, and shape the interactions among them (see March and Olsen, 2004, Ostrom, 2005, North, 1990), the first and basic level of analysis includes the rules, norms, values which constitute the core attributes of institutions (Ostrom, 1992, North, 1990, Scott, 2008) (see component A in Figure

4.3). According to Hollingsworth (2000), these attributes serve as the foundation and can thus exert much influence on other aspects to resource management analysis. This implies that the appropriateness of the institutional design influences outcomes of the water systems, as shown in Figure 4.3. It is established that decentralised resource management is successful where accountability, transparency, participation, and equity are clearly established in the institutional design (Blaikie, 2006, Rahman et al., 2012). For instance, accountability in community-based systems depends on the social processes used to develop rules and whether there is a mechanism for holding the community accountable to the larger society.

Accountability in community-based management also depends on the how the rules at the community levels are designed and whether the rules make room for holding actors (leaders) accountable to the general community (McGinnis and Ostrom, 2014). This implies that the knowledge of the resource users on rules can facilitate their enforcement (Ostrom et al., 1993). For example, in Kolhapur (India), community-managed water introduced a policy on disconnection: this ensured that households paid their bills. However, non-community managed systems had a higher level of non-payment (Rouse, 2013). The outcomes of the interaction feedback to the participants and can also affect the drivers with time (Ostrom, 2005). For example, improved transparency and accountability in management can increase the confidence that customers have in management, and their willingness to pay for water. Therefore, given the significance of accountability and participation in water management, as also demonstrated in chapter three, a clear policy and legal framework that recognises and support them (i.e. accountability and participation) in water management is important (Rouse, 2013) and needs to be examined in CBWM.

In summary, CBWM is based on a multiplicity of actors and institutions of varying degree of formality (Cleaver and Toner, 2006). Decision-making at the local level is nested within government structures. This enables the higher level (regulatory level) to provide supervision and resources for efficiency at the local level (Mansbridge, 2014). Hence, actions at one level are affected by rules, and both actions and rules are also shaped by another level of rules, thus creating a nested situation (Blomquist and deLeon, 2011). For example, in Ghana, the mode of operation and the provisions of the rules at the operational levels are collectively shaped by a several legislative instruments, including the L.I 2007 and the CWSA Act 546 at the national level (see CWSA, 2011, CWSA, 1998).

Several actors across a spatial hierarchy of governance are involved in water services delivery (Figure 4.3), in which they play different but complementary roles. As noted by Andersson and Ostrom (2008), studies that relate to polycentricity need to look at the interaction of multi-level actors.

4.4.2 Component B: Action arena

The action situation is where all the actions take place, where actors transform inputs into outcomes (McGinnis and Ostrom, 2014, Ostrom, 2005). As shown in Figure 4.3, the action situation refers to the CBWM (discussed in chapter two) and it is the centre at which actors at the various levels direct their multiple and complementary functions in order to produce outcomes. Linked to the action situation are the actors. Theoretically, actors are expected to participate in the design of institutions that are supposed to govern their behaviour (Pahl-Wostl, 2009). As shown in Figure 4.3 (component B), there are three major levels as far as CBWM is concerned: the national (policy), the regulatory and the operational levels. The regulatory and the national levels recognise the rights of users to organise and devise their own institutions, which will be appropriate to local context and conditions (Armitage, 2005). The national level actors consolidate and legitimise the policies for the water sector (see line **ã** in Figure 4.3).

As demonstrated in chapter two, small towns are peculiar (mix of rural and urban characteristics) and, as such, there is the need for a broad range of actors, within and outside the sector including the role of the private sector (Mugabi and Njiru, 2006, Tortajada, 2010b, Berkes, 2006), that emerge sporadically to provide services and technical support in water management. For example, with the current focus on the water-energy nexus, water governance may not be *solely* embedded in multiple nested layers of actors as shown in Figure 4.3: there are other actors, especially those in the energy sector, who are involved in the action situations (Villamayor-Tomas et al., 2015). For example, in Ghana, the water systems are mainly powered by hydro-electricity, which makes the presence of power producing companies necessary in water services delivery. Therefore, with a growing mix of state and non-state actors a closed and nested form of institutional arrangement is less emphasised (Keast et al., 2006). Moreover, the presence of other organisations, either in water or outside the water sector, and their linkage with the community-based water organisations may help improve knowledge sharing (Tortajada, 2010b, Madrigal et al., 2011).

Therefore, in line with water rules in Figure 4.3, this study looks at the interactions among actors, which can be horizontal (interaction among actors of the same level), or vertical (interaction between different levels) (Lance, 2009, Herrfahrdt-Pähle, 2014). In this regard, the study examines the institutions at the operational level and how they relate to the regulatory level in order to manage the water systems. The horizontal level consists of interactions within the operational level (small towns) and the vertical interaction consists of the operation level and regulatory level.

Focus of analysis: The focus of analysis in this study is the operational level (highlighted in Figure 4.3, component B). It is at this level that the water systems are located and community-based level management bodies, the Water and Sanitation Management Teams (WSMT) and

the operating staff, are responsible for their operation and maintenance. However, the activities of the operational level are influenced and structured by the regulatory level actors. A key function of the regulatory level is to provide technical support services to the operational levels, to monitor compliance, and where necessary, impose sanctions for defection (Mansbridge, 2014, CWSA, 2010). Hence, as far as CBWM is concerned, it is anchored at the regulatory and operational levels and, as such, the institutional analysis of this study extends to the regulatory level. All the actors are under the influence of the institutional design and are "functionally interlinked" (Saleth and Dinar, 2004:23). That is, individual actors have a varying degree of connectivity with other actors (component B of Figure 4.3), and their overall performance become inseparable (i.e. collective performance) because the functioning of one actor at one level hinges on that of another level (Saleth and Dinar, 2004).

The strength of these actors depends on their communication, i.e. actors at the higher level informing those at the lower level of their views about the management of the systems (Saravanan, 2008). Expectedly, as actors interact, based on established rules and needs-based, they learn from experience and change their mode of operations (actions and rules) accordingly, in response to feedback from their environment (Pahl-Wostl, 2009, Innes and Booher, 1999, Schneider and Somers, 2006). Therefore, the effectiveness of decentralised management of the resource system depends on the interaction among the actors who have been entrusted to manage the resource (Andersson and Ostrom, 2008). In the same way, the adaptive capacity of the different levels are interdependent (Smit and Wandel, 2006), where the adaptive capacity of the operational level depends on the enabling environment of the regulatory level. This implies that the proper functioning of the water system depends on the ability of the individual actors *and* the functional linkage between them (Saleth and Dinar, 2005), although there are certain conditions that affect the interactions of actors.

4.4.3 Component C: Drivers of CBWM and adaptive capacity

In institutional analysis, it is important to consider contextual factors (Edwards and Steins, 1999) (termed here as "drivers" and elaborated in chapter three) so that the outcome of the analysis can better inform decision makers (McGinnis and Ostrom, 2014). These factors shape the manner in which actors of the situation relate and take decisions about the resource situation. Therefore, analysing their effects on the actors gives a comprehensive picture of the action situation (Fischer et al., 2004, Edwards and Steins, 1999). Therefore, the interaction of socio-economic, demographic characteristics, technological, political factors, social structure and community level dynamics, financial resources, and the level of human resource are all drivers that can impact on the action arena and, consequently, the performance of the water sector (see, for example, Berkes, 2006, Mehta, 2009, Milman and Short, 2008, Saleth and Dinar, 2005, Carter et al., 1999, Muller, 2007, Moriarty et al., 2013, Harvey and Reed, 2004, Edwards and Steins, 1999). Harvey and Reed termed these drivers "building blocks" and that they

interrelate to influence the functioning of the water system (Harvey and Reed, 2004:9). That is, when these drivers positively complement each other, then they will facilitate good management outcomes. For example, an improved revenue base of the water system can facilitate professional management and acquisition of technical skills through training (Opare, 2011, Schouten and Moriarty, 2003, Cleaver and Toner, 2006), and so outcomes can be beneficial to those involved (Ostrom, 2005).

These drivers can present themselves in the local context (within the resource management regime), which is captured as the operational level in Figure 4.3. Alternatively, they can be found externally. That is, they can be exogenous to the resource management regime and often outside the control of the resource community (Edwards and Steins, 1999). Nonetheless, some of the factors constitute a continuum. That is, the local level factors can affect, and are affected by the external factors (Edwards and Steins, 1999). Each driver influences and is influenced by several other drivers and the manner in which a system evolves and unfolds depends on these drivers (Lance, 2009, Schouten and Moriarty, 2003). In other words, the drivers that the actors are required to adapt to are sometimes not independent of each other but rather interrelate and, as such, can affect the action situation (McGinnis and Ostrom, 2014).

As an example of demographics acting on other drivers, Muller (2007) observed that as the population grows, there is higher demand for water for multiple uses, putting stress on the water resources. Additionally, characteristics such as rural to urban migration, unplanned settlement patterns, climate change and environmental degradation put pressure on water systems (WHO and UNICEF, 2006, Milman and Short, 2008). For instance, out of 160 countries that UNICEF has data for 1990 and 2004, the population with access to water declined in 29 countries within the period, with factors such as population growth, migration, decline in the availability of water due to climate change, conflict and political changes as influential in the decline (Milman and Short, 2008).

The uncertainty is that unlike the institutional design, which is relatively stable, these drivers are less stable, context specific and continue to change at different proportions, hence the term contextual factors (Schouten and Moriarty, 2003, Edwards and Steins, 1999). The changes can be slow or fast, bad or good, and whichever form it takes, the actors need to adapt to them (Berkes and Ross, 2013). Thus, the ability of the actors to handle these changes determines the performance of the water system (Berkes and Ross, 2013, Martin et al., 2005) (see the relationships between components B, C and D in Figure 4.3).

Managing resources for sustainability should address issues of adaptive capacity in handling the eminent changes in the socio-economic environment. That is, as a system evolves and organises, it must be able to detect and adapt to changes within and outside its environments

in order to survive or stay longer (Holden, 2005, Rammel et al., 2007). The challenge in resource management is to identify when a change in these drivers either "fails to initiate an undesirable outcome or initiate a desirable outcome" (Edwards and Steins, 1999:218). Therefore, the ability of the actors to strategise and mobilize (resources) to either anticipate or respond to stresses remains significant (Engle, 2011).

Adaptive capacity of actors: Various related definitions exist for adaptive capacity, especially in resource management. Basically, adaptive capacity refers to the ability of a system to adjust or respond to changing internal and external drivers (Engle, 2011, Folke et al., 2010). Adaptive capacity in relation to natural resource management can be viewed from two perspectives: proactive (anticipatory) and reactive (autonomous). Proactive approaches refer to the "mechanisms that represent long-term and iterative process that can integrate new information as it manifests, while reactive approaches are flexible mechanisms that can rapidly respond with quick innovation and transformation to minimise short-term and long-term damage from specific events" (Hill and Engle, 2013:180). A reactive approach creates what Hill and Engle (2013:180) term "crisis management mentality". This is where resource managers become less innovative in averting or planning against disturbances and wait to respond when disturbance hits. Reactive is largely handled at the local level but proactive approaches need policy support (Hill and Engle, 2013, Adger et al., 2004), depending on the system in question. For example, human beings can proactively adapt to future challenges in resource management through strategic planning (Hill and Engle, 2013).

The above perspectives on adaptive capacity have been recognised in previous studies. According to Hollingsworth (2000), apart from responding to the drivers, actors need to modify them, where necessary, to be able to produce the desired results. Based on that, Adger et al. (2004) described adaptive capacity as the ability of a system to modify or change its characteristics or behaviour so as to cope better with existing or anticipated stresses. This involves modifying the institutions (see the link between B and C in Figure 4.3). From an institutional perspective, there is no explicit definition of institutional adaptive capacity, but based on the literature on adaptive capacity, Gupta et al. (2010) explained that *institutional adaptive capacity* entails the characteristics of institutions that enable actors to cope with changes; and the degree to which the institutions allow and encourage actors to modify such institutions to cope with changing situations. That is, institutions need to be flexible to enable actors in a system to learn from experience and become innovative to handle both expected and unexpected disturbances. This emphasises the point that institutional flexibility promotes adaptive capacity (Saleth and Dinar, 2004). This helps the resource systems to maintain their characteristics through space and time (Cumming et al., 2005).

Adaptation of the water resource system can be assessed using the adaptive capacity of the water users and managers as proxy (Pandey et al., 2011). This study supports and advances Pandey et al. (2011) position that society is a major user of water resource and, as such, society's attributes represent a water resource system's ability to cope with stresses. The difference between this study and that of Pandey and colleagues is that this study focuses on stand-alone potable water resource system while Pandey and colleagues studied river basin management where ecological variables are stronger and direct. As such, adaptive capacity varies in space and time, from one system to another, one sector to another and one geographical area to another, and the factors that influence adaptive capacity equally reflect these variations (Yohe and Tol, 2002, Smit and Wandel, 2006). Thus, adaptive capacity is a function of various factors, including: the range of available technological options (especially appropriate technology); the available resources and their distribution across the population; the structure of critical institutions and the criteria for decision-making; the human capital and the level of social capital; the ability of actors to access and process credible information, and be in a position to change, based on processing the information; the public's perception of both the source of stress/shock and its significance to the local level; and finally, policies and incentive structures that facilitate investment in the natural resource base (see Crabbé and Robin, 2006, Armitage, 2005, Gupta et al., 2010, Ostrom, 2009, Yohe and Tol, 2002, Pahl-Wostl, 2007).

In community-based natural resource management (such as water), adaptive capacity depends on the ability to act collectively in the face of various internal and external threats to the "use and protection of common resources" (Armitage, 2005:704). It does not relate to only the ability of systems to manage risk, but also their ability to take advantage of opportunities. To do this, the actors are required to combine different types of knowledge, western scientific and local/traditional, across multiple scales (Armitage, 2005). Hence, a system's existing adaptive capacity is able to give an indication of the system's ability to respond to unexpected disturbances. Therefore, it is also a measure of the system's performance that could be included in the suite of performance measures of the water systems (see Blackmore and Plant, 2008, Ostrom, 2005).

In a study of river basin management in China (Pearl), da Silveira and Richards (2013) concluded that adaptive capacity is enhanced where operational linkage among units are adequately developed through effective monitoring and information sharing. It was also established that where community members depend heavily on a particular resource for a greater part of their livelihood or daily activities, then self-organisation is likely be high (Ostrom, 2009). For instance, due to heavy reliance on water for various uses in parts of Costa Rica, adaptive capacity was facilitated by a strong desire of community to be proactive in solving water problems (Madrigal et al., 2011). Therefore, it can be argued that the degree to which

the various actors can adapt determines the outcomes (functionality of the water system) (see Figure 4.3).

4.4.4 Component D: Performance outcomes of the water systems

"Measuring performance of a system is difficult, especially where what has to be measured keep changing" (Hubbard, 2009:177). The challenge in measuring performance relates to the multi-faceted nature of performance (economic, social, environmental and governance) and the different expectations of actors as regard these facets of performance (Hubbard, 2009). These facets apply to water systems performance (see component D in Figure 4.3). Despite the difficulty in measuring a water system's performance, the performance level is used as a measure of a water system's sustainability and it is often done based on various variables (Hubbard, 2009, Blackmore and Plant, 2008, Saleth and Dinar, 2004, Opare, 2011, Milman and Short, 2008, Madrigal et al., 2013, Madrigal et al., 2011). The essence of the indicators (see Appendix A) is to provide information that can point to the functionality of the water systems. Although performance of the water systems is based on a point in time, a trend of performance indicators can provide a good predication of future outcome of the water systems (Madrigal et al., 2011).

Performance variables such as governance and regulations, social-economic issues, natural environment, operations and system infrastructure have been used to assess the sustainability of urban water systems (Blackmore and Plant, 2008). Similarly, other writers classified performance variables into personnel, physical conditions, financial and economic efficiency, operations and quality of service (Alegre et al., 2006, Saleth and Dinar, 2004). Significantly, Milmam and Short proposed and implemented a Water Provision Resilience (WPR) that seeks to measure the ability of the service provider to maintain or improve the percent of the population with access to safe water into the future. Based on the WPR, they assessed six main areas of the water system, namely: continuity of water supply, finances, service provision and coverage, water quality, infrastructure condition and water governance (Milman and Short, 2008). Assessment of these variables point to the aspect of the water system that need attention in order to ensure access to water (Milman and Short, 2008). For instance, using similar variables, it was established that consumer satisfaction of water services was tagged to their assessment of water quality, water availability and management activities. Although subjective, an assessment of satisfaction is important because ignoring it can result in public discontent in the water governance, which can lead to other serious management problems (Madrigal et al., 2013, Madrigal et al., 2011). Therefore, a holistic approach gives an indication of the aspect that actors (water managers) need to focus on to ensure satisfactory services delivery.

In this study, these performance variables have been harmonised into four broad categories: (i) financial and technical efficiency; (ii) water reliability, quality, and pressure; (iii) consumer satisfaction with management activities and service delivery; and (iv) governance (accountability, transparency, participation in the decision-making process). Measures of financial and technical efficiency of the water systems are objective. However, measures of households' perception of management activities, satisfaction and accountability are subjective. Nonetheless, households' assessment of these variables is important because it gives an indication of the state of the water systems (see Pandey et al., 2011, Madrigal et al., 2011). Therefore, these variables and their indicators serve as the leverage points and are deemed necessary for the water system's survival. These variables have been carefully selected to cut across several areas of the water systems and their management to provide a holistic view of the water system. This is because an attempt to use a single metric of analysis for the water systems can lead to a wrong conclusion on functionality and thus wrong policy prescriptions, as observed by Gasparatos et al. (2009). Appendix A shows the variables and the sub-indicators, which have been used in this study. As shown in Figure 4.3, following an evaluation of the performance, actors may be required to adjust their actions and rules (through feedback).

4.5 Conclusion

The focus of this chapter has been to carefully identify the key research components of an institutional analysis of CBWM in the following study, identifying an analytical framework to guide the data collection and analysis. Other researchers (see, for example Eguavoen, 2007, Livingston, 2008) who have applied an institutional analysis in water management, have used Scott's framework of institutional analysis. Although Scott's framework (normative, regulative and cognitive pillars of institutions) is specific to the analysis of institutions in water systems, and has been applied in urban water management (Livingston, 2008) and in rural and small town water (Eguavoen, 2007), it does not seek to directly link the three pillars to outcomes, nor does it pay attention to interactions among actors of a particular action situation. Instead of Scott's framework, the IAD framework, which has the potential of linking how actors of a resource situation interact based on a set of rules and within a set of external variables (drivers) to produce outcomes, was adapted as the appropriate framework for analysing CBWM. Based on the key attributes of the IAD framework, an analytical framework was designed in order to guide the main focus of the research.

The analytical framework shows that CBWM has a nested form of institutional arrangements, signifying that they are made up of many actors who are affected by drivers as they interact. A holistic combination of institutional analysis and performance in a single framework makes it robust for examining CBWM in small towns. As noted by Walsham (1995), the significance of the theoretical framework is to guide the design process of data collection and analysis, and

this chapter rightly provides a detailed framework to guide the research methodology. Therefore, the research tools were carefully selected to ensure that the empirical evidence collected actually answers the research questions. Quantitative and qualitative tools were used to examine the performance variables presented in the previous sections and to critically analyse the institutional arrangements (see details of data categories in the next chapter).

5 Research methodology and the study area

5.1 Introduction

The main focus of this chapter is to systematically explain how the research was conducted to address the aim of the research: examine the performance of small town water systems and the how it is influenced by the institutional arrangements structuring water governance in North-western Ghana. The rest of the chapter is divided into two main sections. Section 5.2 presents the research methodology: a discussion of the research design and paradigm, the means by which validity and reliability were established in the study, a well-structured procedure of arriving at the study cases, the major data sources, data collection methods and how data was analysed. Section 5.3 presents an overview of the study area. It highlights the physical, demographic, and socio-economic characteristics of Ghana, with much focus on the Upper West Region. The last part of section 5.3 analyses the evolution of the water sector, particularly the rural and small town water sector in Ghana.

5.2 Research methodology

5.2.1 Research design

The research design, according to Bryman (2004), provides a framework for the collection and analysis of data, and this has to be guided by the research questions (Yin, 2003). This study uses the case study design in the collection and analysis of data. There are a plethora of explanations to case study but in recent times, many have cited Yin's definition because it provides a wider spectrum of application. In his third edition on case study research, Yin explained a case study as:

> "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and the context are not clearly evident. The case study inquiry copes with the technical distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical proposition to guide data collection and analysis" (Yin, 2003:13-14).

Although the emphasis in Yin's definition is on contemporary events, it does not exclude historical investigation and analysis. This is also critical in this study, where some cases (water systems) have evolved over time. Hence, the case study also entails an investigation of a "well-defined aspect of historical happening that the investigator selects for analysis" (Bennett, 2004:29). Combining contemporary and historical events, case studies have the ability to examine complex relations such as "complex interaction effects" (Bennett, 2004:47). That is, there are several combinations of activities that can lead to a particular outcome of an action situation and case study has the potential to examine such an interaction (Bennett, 2004).

Therefore, the aim of adopting the case study approach for this research was to critically understand how community-based water management (CBWM) is fairing in small towns.

The case study gives an opportunity for a holistic view of the phenomenon allowing the researcher to study different aspects and the relationship between the various aspects (Meyer, 2001) of the water systems. Because the case study involves a detailed collection of data, it provides an in-depth analysis and understanding of the complexities of processes and a wider organisational behaviour (Gable, 1994, Fossey et al., 2002). With the case study, the researcher is able to understand real-life interventions that might be too complex to be understood by other research methods (Benbasat et al., 1987, Dopson, 2003). This makes it suitable for use in institutional analysis within the water sector. With in-depth interviews it has the advantage of generating a strong explanation of the evolution of water management practices in the study area.

A Case study can involve single or multiple cases, and within a single study, multiple levels of analysis can be carried out (Yin, 2003, Meyer, 2001). For Benbasat et al. (1987), multiple case design allows for cross-case analysis and this gives the researcher a better understanding of the phenomenon in its real-life context. In this study, the analysis entails within-case analysis (that is analysis of a particular water system), and comparison across the four cases. As noted by Bennett (2004), even single case studies often make comparison to wider groups of cases, mostly in the literature. As such, the use of four cases makes it imperative to draw similarities and differences among the cases, and analyse how they fit into the wider theory of community-based management. Comparative study is more appropriate when the researcher seeks to examine how a phenomenon (such as CBWM) manifests in different settings. As such, it examines similarities and differences among the cases in order to understand social reality (Bryman, 2004).

Therefore, a case study approach is able to unravel the differences and how actors respond to them. Moreover, a comparative case study approach helps the researcher to provide explanations for what institutional attributes make a particular system better than the other(s) (Andersson and Ostrom, 2008). This makes a comparison of cases suitable for CBWM as it helped the researcher to understand the nature of water management across the communities.

5.2.2 Research paradigm

The researcher's lens or way of thinking about the world (quantitative and qualitative divide) is based on a particular paradigm: ontological and epistemological stance (Gray, 2014, Sale et al., 2002). In terms of ontology (belief about reality), the positivists view reality as a "concrete structure" while the interpretivists view it as a mere "projection of imagination" (Morgan and Smircich, 1980:492). The basic epistemological stance of the interpretivist is to gain insight of

the phenomenon, such as CBWM, and how social reality is created while the positivists seek to construct science or focus on facts (Morgan and Smircich, 1980, Gray, 2014). The positivists hold the view that facts and values are distinct and scientific knowledge consists of only facts (Walsham, 1995). In a study such as CBWM, which involves several actors interacting according to rules, as demonstrated in chapter four, taking a positivist stance alone can be misleading because it will omit the social meaning attached to the statistical presentation of facts. As demonstrated in Figure 4.3, evaluation of performance of the water systems aligns to positivists' stance but such a stance alone is unable to explain the *causes* of the existing performance. Therefore, the positivists can explain *what* is happening but fails explain *why* it is happening.

In qualitative research, the researcher is always part of the study and comes with his/her experience to the research process (Stenbacka, 2001), continuing to reflect on the research problems and the conceptual issues as the study proceeds. The researcher seeks to understand a phenomenon in its real world context and how the phenomenon emerges naturally as the study proceeds (Golafshani, 2003). Advocates argue that the human institution is dynamic and, as such, a research approach that allows dynamism and flexibility is required. Within the quantitative-qualitative divide, qualitative research relatively allows enough room for flexibility (Miles and Huberman, 1994, Maxwell, 2012). However, Bryman (1984) argues that there is hardly any quantitative researcher that will deny the relevance of some qualitative materials in his research and vice versa. Hence, Bernard (2011) described the two as sequential.

This study takes the stance that, an analysis of the action arena, interaction of actors and the action situation, as demonstrated in chapter four, aligns itself *more* to interpretivism. That is, engaging systematically and critically with the actors is a way of understanding how they interact around the action situation, which potentially explains the basis of outcomes (performance of the water systems). Therefore, from an institutional perspective, there is the need to move from a purely positivist stance and incorporate an interpretivist perspective, which can take account of how the actors subjectively interpret their experience with institutions (Suddaby, 2010). As such, an interpretive case study has value because it delves deep into the research phenomenon and is able to document and communicate vividly the research participants' view of the study phenomenon (Andrade, 2009). Ontologically, there are multiple realities/factors about whatever is observed in CBWM. These factors/realities keep changing and how actors adapt to the changes might influence the performance of the water system as demonstrated in chapter four. Therefore, a study of this nature falls within the continuum of positivist and interpretivist paradigms. However, it aligns itself more to the interpretative paradigm: whilst specific indicators have been defined to measure the

performance of the water systems, a detailed analysis of the institutional underlying of their performance is of great significance.

This study recognises that quantitative and qualitative approaches have limitations. For example, whilst quantitative approach is criticised as often neglecting the socio-cultural construction of variables, a qualitative approach is criticised as being anecdotal (Silverman, 2006). The existence of an epistemological chasm between quantitative and qualitative research necessitates the emergence of mixed methods (Olsen, 2004, Creswell et al., 2003). Mixed methods seek to combine the two in a single study (Maxwell and Loomis, 2003), and involve the collection and analysis of both quantitative and qualitative data in a single study, in which the data are collected concurrently or sequentially (Creswell et al., 2003). Fundamentally, mixed methods combine quantitative and qualitative methods, approaches, and concepts in a complementary manner, thus maximising the strengths and minimising their weakness, providing triangulation (combining approaches/methods to get two or more views on the same phenomenon) and ensuring greater validity (Johnson and Turner, 2003, Jick, 1979, Olsen, 2004, Onwuegbuzie and Johnson, 2006, Bryman, 2006). This is because using two or more data collection methods allows validity and reliability problems to counterbalance each other (Abowitz and Toole, 2010). As such, the approach ensures that one method provides data to explain findings produced by the other, thus enhancing the integrity and usefulness of the findings (Bryman, 2006).

Therefore, based on the differences in perspectives, and the need to use both to understand the same phenomenon, the Researcher employed mixed methods for complementary purposes and to allow for holistic investigation into CBWM. By studying all the major components of the water systems (discussed in Chapter four), the researcher can, as put by Jick, “improve the accuracy of his judgments” (Jick, 1979:602) by collecting different kinds of data bearing on the water systems. This actually equipped the Researcher with adequate information about the actors and their relationships (both in principle and in practice) with respect to CBWM. Therefore, quantitative data from households are triangulated and complemented with qualitative data from key informant interviews, focus group discussion, physical observation and official documents.

5.2.3 Contextual factors of the research

In research, it is argued that the choice of the research design depends on the research questions and overall goal of the research (intended purpose) rather that the researcher (Marshall, 1996, Yin, 2003, Maxwell, 2012). The research questions (the hub of the research) have a bearing on what has already been documented about the subject of the study. As such, the Researcher, as much as possible, has tailored the literature review to address what has been researched and documented with regard to the core research questions. Similarly, the

analytical framework is informed by the research questions and the intensive literature of the research.

The researcher's pre-understanding, that is preliminary findings about the phenomenon, through primary sources or secondary sources (literature review) play an important role in improving the validity of the study, as noted by Stenbacka (2001). The choice of data collection method is subject to constraints, such as the researcher's skills and resources available (Meyer, 2001, Maxwell, 2012, Bernard, 2011). Bernard (2011) further classified the resource into three: time, money and people. According to Bernard (2011:57), the "people" include the researcher, "others involved in the study and those with whom the researcher is studying". The time available to the researcher and the research participants to conduct the study and the financial resources available usually influence the approach of the study. During the familiarisation visits, which were conducted in July 2013, the Researcher was informed that research participants would only be available during the dry season (from December to April), because farming is the main source of employment in all the communities and they are often busy during the rainy season. Interestingly, some household members relocate to stay on the farms for the season. In terms of financial resources, although the Researcher did not get funding for the fieldwork, he was able to conduct the field work from his savings.

Another contextual factor that guided the data collection is ethics, because it is important in this research, as it is in other fields. The University of Reading equally recognises this ethical issue. To work within the remits of the University, the research ethics protocol of the University was duly followed: the field work was authorised by the Head of Department under the exception procedures of the University research ethics guidelines. However, the University standards procedures as regards consent, confidentiality and data protection were adhered to (see Appendix E for a sample of a signed consent form).

As part of research ethics, Gray (2014) maintained that interviews should not harm or jeopardise the participants or the subject being studied. As such, at the field level, the Researcher respected the privacy of the participants and was equally guided by the traditional protocol of the four study areas. However, due to uncertainty of traditional tensions in the area, the Researcher entered the communities through the WSMTs, who are expected to be neutral in respect of traditional issues. Respect for participants' privacy and appropriate community entry facilitated a smooth data collection in the field.

During the field data collection, the consent of participants was sought and interviews or discussion only proceeded after the participants agreed to take part and they signed a consent form (see Appendix E for a sample of a signed consent form). There were instances where participants agreed to be interviewed but did not agree to be recorded using digital recorders

and in such situations, the Researcher respected their rights and privacy. There was however an advantage in most instances where participants were not digitally recorded because they freely expressed their opinion on the water management. The Researcher observed that where audio recording was permitted, some participants still entertained fears of raising some sensitive issues about the water systems. In such instances, the Researcher reiterated the focus and the ethnical terrain within which the research is being conducted and such explanations facilitated detailed discussions.

A researcher's previous knowledge is also important in designing research, although it is important to go into the research with an open mind (Andrade, 2009). In terms of experience, the Researcher has previously worked with a consultancy firm that provided services in water management and therefore has working knowledge of water management. The Researcher's preliminary knowledge of the water systems, in terms of the year of establishment and geographical distribution, facilitated the sampling process. It is emphasised here that the Researcher's knowledge of the area did not deny him the flexibility and critical analyses of water management. Rather, taking more of an interpretivist stance in this research, the research was approached with a high level of openness and flexibility in the data collection. The Researcher's knowledge and his stance rather aided him in probing, especially during interviews and discussions. Therefore the personality of the Researcher, with working knowledge of the sector, facilitated a distinction between the declared institutional arrangements for CBWM and the day-to-day practices in the communities.

The Researcher's personality, as a native of the region and one who speaks the local languages of the areas, aided the research, especially the primary data collection. For example, some respondents, particularly the illiterate elders, resorted to the use of local idioms to strongly convey their views on CBWM, thus, greatly enriching the data on CBWM. Moreover, as a native, the participants viewed the Researcher as their "own son" and readily discussed at length their views on CBWM, including sensitive issues bordering on mismanagement of the water systems. Although the use of local idioms is common and known to many community members, it implies that non-natives and people who are not fluent in the local languages can miss out the significance of using local idioms to communicate on CBWM. Additionally, as a way of protecting the dignity of the communities, non-native may not be privy to an in depth discussion on CBWM, especially on issues of mismanagement of the water systems.

Additionally, although there are challenges in water management that require solutions, the Researcher presented himself not as the source of the solution. Nonetheless, the challenges of the water sector in the communities at the time of the field work and given the Researcher's level of education in relation to the research participants, they (participants) perceived his presence as a source of solution to the challenges. The Researcher had to reiterate the focus

of the research and the fact that he was not privy to the challenges of the communities prior to the field work and for that matter cannot prescribe immediate solutions. However, in developing his research and analytical competence in water management, the dissemination of the research output may contribute to finding solutions to the sector challenges. For instance, after the regional level focus group discussion (FGD), two of the communities called the Researcher to inform him that the District Assemblies were there to carry out financial audits of the water systems. This was one of the benefits of the regional level FGD (see section 5.2.6.4), where all the actors (from the community level, through to District level and on to the Regional level) met to discuss their respective roles and how they interact, both normatively and in practice as regards water management. At the end of this FGD the participants applauded the approach of the research and added that the interactive session had reawakened all actors on their responsibilities in water management.

5.2.4 Sampling of cases

The study is based on multiple cases. The number of cases in studies that involve more qualitative than quantitative data collection and analysis are often small, to allow an intensive study that will generate adequate information for analytical generalisation (Miles and Huberman, 1994, Teddlie and Yu, 2007, Marshall, 1996, Curtis et al., 2000, Gray, 2014). However, there is no consensus on what constitutes a "correct" number of cases, such that the outcome of the study can have wider application (analytic generalisation). Analytical generalisation relates to whether the evidence from the cases support the theoretical foundation of the study phenomenon (Gray, 2014), that is, theorised arguments of a community-based water management.

The definition of a case study clearly indicates that it should have a case (object of the study/unit of analysis) which in turn should be: (i) a complex functioning unit; (ii) studied in its natural environment using different methods; and (iii) contemporary (Stake, 1995, Yin, 2003, Yin, 1994, Riege, 2003, Rolf, 2003). The unit of analysis is central to the case study and defining it should be the major step in the study (Yin, 2003, Yin, 1994, Patton, 2002), and this study is no exception. Theoretically, it has been advanced that there is no stringent difference between case and unit of analysis (see Patton, 2002, Yin, 2003, Miles and Huberman, 1994, Baxter and Jack, 2008). However, this argument is not universal and it depends on the nature of the study. For instance, following an analysis of Yin's holistic verses embedded case study, Grünbaum (2007) established that the distinction between case and unit of analysis relates to numbers (one case versus n cases). He went further to identify four designs: "one can analyse more cases but with one unit of analysis in each case; one can examine more units of analysis in one case; one can analyse both more cases and more units of analysis; and finally, one can have one case and one unit of analysis" (Grünbaum, 2007:87). It is clear from the above

analysis that in any of these designs, the unit of analysis is demarcated by the individual and/or actions of the individual.

In this study, the case refers to the small town water system and the units of analysis are the actors at the operational and regulatory levels whose primary function is to ensure the functioning of the water systems in small towns. Going by Rolf's argument that a case is a phenomenon specific to time and space (Rolf, 2003), it implies that a case is dynamic and needs to be contextualised in any research that uses the case study approach. In this context, the case can cut across a number of communities. For instance, the water system in Babile has been extended to Brifo and Konyukuo, and that of Busa has been extended to Biihe and Dawdiyiri. These are neighbouring communities within 2km radius (see elaboration in section 5.3.4 below). The extension of water to satellite communities makes it necessary to focus on the *water systems* as the cases rather than the *communities*. In this respect, the satellite communities' views on the water management were incorporated through the household.

The choice of cases does not rest on representation but on theoretical (conceptual and analytical) basis (Miles and Huberman, 1994), although efforts were made to give a fair geographical and socio-cultural representation of the selected cases in the Upper West Region (see Figure 5.5 in section 5.3 below). Rather than numbers as the focus, sample size is based on the context of the study, that is, the theoretical principles which may not be dependent on the number of subjects considered (Sarantakos, 1996). In this instance, the sampling was to help explore how institutional theories can be extended to CBWM to critically examine the empirical evidence of CBWM performance.

The Region has 17 small town water systems. Out of these water systems, nine were constructed before the water sector reforms in 1994 and the remaining eight were constructed after the reforms (see section 5.3.4 below for detail characteristics of the water systems). Out of the 17 water systems, four were sampled for the study: comprising two pre 1994 and two post 1994. The four cases cut across all the major ethnic groups (Waala, Dagaara and Sissala) in the Region as well as the geographical scope of the region (see section 5.3.4 below). There exist variations across ethnic groups due to their cultural differences. Within the development discourse, especially in water management, culture is seen in various manifestations: as a constraint that prevents a section(s) of the communities in development; as a resource that empowers traditional authorities to legitimise development; and as a force that binds community members together (Cleaver, 1999). These views could have implications on how water is managed in different cultural settings. Therefore, selecting cases based on these characteristics provides a comprehensive perspective of the water systems. The sample size for the household survey is presented in Table 5.1.

Table 5.1 Distribution of sampled households

Sample characteristics	Babile	Busa	Gwollu	Daffiama	Total
Stand-posts surveyed (n) (% of total household survey in community)	n = 15 (40.5%)	n = 21 (91.3%)	n = 22 (44%)	n = 8 (20%)	n = 66 (44%)
Total indoor taps in the communities	92	3	145	141	381
Indoor taps surveyed (n) (% of total household survey in community)	n = 22 (59.5%)	n = 2 (8.7%)	n = 28 (56%)	n = 32 (80%)	n = 84 (56%)
Percentage of total indoor taps in the community surveyed	23.9%	66.7%	19.3%	22.7%	22.1%
Target sample (stand-post and indoor taps)	38	23	50	49	160
Actual sample surveyed (% of sample size)	37 (24.7%)	23 (15.3%)	50 (33.3%)	40 (26.7%)	150 (100%)
Response Rate	97.4%	100%	100%	81.6%	93.8%

Source: Field Survey, 2014

In terms of sampling, 20% of the total indoor taps was the target sample size. It is important to note that there was no sample frame for those who use the stand-posts because the management staff could not provide that. Due to the relative homogeneity of the population, with respect to the research focus, the target sample size in each community was 20 customers of the stand-posts. The stand-posts in each community are sited based on the geographical sections of the community. In order to ensure a fair representation of the sections' views on water management, the selection of customers of the stand-posts for the survey spread across the sections of the communities. However, due to the haphazard location of houses (non-technically planned settlements), the selection of customers (households) of the stand-posts for the survey was based on simple random sampling. On average, the research covered 93.8% of the expected number of households to be covered. In Daffiama, the rate was 81.6% of the target because the survey reached a saturation point, where responses from the households were very similar and repetitive. Moreover, out of the 12 stand-posts, only one was found to be functioning (vending taking place). Hence, instead of the expected 20 households from the stand-post, only 8 were surveyed. As such, the Researcher shifted attention to qualitative interviews.

5.2.5 Validity and reliability

Validity and reliability remained central to this study, especially at each stage of the data collection and analysis. According to Bernard (2011:41), "nothing in research is more important than validity". For Patton (2002), the researcher needs to consider validity and reliability throughout the research process. This is because for a measure to be useful, it must have reliability and validity (Nasar and Julian, 1995). Validity, according to Stenbacka (2001:551), seeks to establish whether the "intended object of measurement actually is measured". That is, whether the scoring of cases adequately reflect the concept the researcher seeks to measure (Adcock, 2001). It can be categorised into internal, external and construct validity. Whereas internal validity looks at how findings accurately maps the phenomenon, external

validity focuses on the extent to which the findings can be generalised to settings similar to the research (Devers, 1999). The case study approach allows for probing and this has the advantage of understanding the concepts and the relationship between them, that is, internal validity (Meyer, 2001).

Validity also depends on the tools, the skills and efforts put in by the researcher (Golafshani, 2003). It is achieved by a non-forcing interview with strategically well-chosen informants (Stenbacka, 2001:552). As established earlier, participation in this study was purely voluntary. Stenbacka (2001) argues that reliability is less useful in qualitative research because it is misleading, since separation of the researcher and the methods is difficult. However, this has to be put in context because, for Miles and Huberman (1994), reliability is relevant in qualitative research and the focus is on quality control. Similarly, Bryman (2004) explained that it is about consistency of a measure of a concept which is influenced by stability over time. In mixed methods, reliability can be improved through triangulation, where both qualitative and quantitative data can be combined to form a coherent picture of the phenomenon under investigation (Gray, 2014). Using two or more data collection methods allow validity and reliability problems to counterbalance each other (Abowitz and Toole, 2010). Hence, once this study involved mixed methods, reliability is useful and this was captured by both quantitative data from household surveys and qualitative data from FGD, key informant interviews and documents review.

The use of multiple actors at multiple levels to understand CBWM also helped in ensuring reliability. This was particularly relevant during the regional level FGD, where actors from the community, district and regional levels were brought together on a common platform to discuss the research phenomenon. In each of the WSMT and operating staff, there were multiple visits to follow-up on issues that emerged during the note compilation and audio transcription. The use of audio and multiple visits further enhanced reliability. Therefore, collecting data at different spatial levels using a well-structured process with multiple data collection generated valid and reliable information on each case.

5.2.6 Data collection methods

The method of data collection in this study, a technique that is used to gather empirical research data (Johnson and Turner, 2003), relied on multiple sources. This is because a case study approach requires multiple sources of data and its strength lies in its ability to deal with the various sources of evidence, including documents, interviews, observations and sometimes household surveys (Yin, 2003, Gray, 2014). Collecting data from these sources requires the support of a field assistant and adequate pre-field preparation.

5.2.6.1 Preliminary field visits preparation and pre-test of tools

An introductory letter was obtained from the School of Real Estate and Planning, University of Reading to facilitate the data collection. The Researcher first visited the Regional CWSA office to introduce himself to the office and to ascertain the number of small town water systems in the region as well as their basic characteristics, such as year of establishment and geographical distribution. This was followed by a familiarisation visit to the selected communities in July 2013. The visit had practical benefits, as demonstrated in section 5.2.3 above.

Prior to the actual field work, the Researcher also reviewed the legal documents of the WSMTs, which were obtained during the familiarisation visit, to acquaint himself with the management obligations. This approach enabled the Researcher to engage in detailed probing, and distinguish between the norm and the practices during the actual field work. The review of the constitutions and the design of research tools were followed by a pre-test in Babile using six households. The tools were revised after the pre-test. For example, the pre-test revealed that, in some households, one member could not adequately respond to all of the questions. This is because in small towns and rural areas, drawing water is the responsibility of women and girls and, as such, distance and duration of fetching water could best be answered by them, as also established by Skinner (2009). The pre-test showed that some male household respondents could not tell how much the household spent on water in a month, neither could they indicate the time spent and distance covered in collecting water. This is because women were mainly responsible for drawing water and its payment. On the other hand, decision-making on water issues, outside the household, rests with the men. With this experience, the Researcher encouraged joint responses to the questionnaire, as and when necessary. Consequently, there were instances where two people responded to a questionnaire, but there was often a lead respondent. The mix of respondents, as and when necessary, thus ensured a comprehensive response to the questions, guaranteeing reliability of household data.

Significant modifications were made to the questionnaires after the pre-test. For example, the households' questionnaires were administered in the local language and, as such, the Likert scale-related questions were revised, by reducing the number of levels (see water service indicators and households views on tariff structure), to reflect the terms in the local language of the study area. Similarly, household's indicators of assessing the water quality, pressure of flow and reliability were derived from the pre-test (see chapter 6 and the households' questionnaire in Appendix I). These modifications were necessary because the Researcher did not want to distort the real views that have been expressed by the households' respondents.

The research was conducted with the help of a Research Assistant[13]. We had a discussion of the research tools and the content of the research. Somers (1992) advised that in institutional research, strict division of labour is least appropriate in data collection because it makes collation difficult for analysis. This admonition is relevant in this study, because it combines qualitative data from interviews, observations and focus group discussions with quantitative data from household surveys. Hence, the Researcher was solely responsible for all aspects of the data collection. This enabled the Researcher to observe participants gestures, especially when some members wanted to talk about sensitive issues. This also provided an opportunity for probing based on such hints. The Research Assistant mainly assisted in the focus group discussions and this enabled the principal researcher to focus on probing and some level of note taking.

5.2.6.2 The role of the theoretical framework in data collection

A key aspect of CBWM is to focus on the water systems' characteristics. A system's characteristics depend on: (i) its components (actors and rules as presented in Chapter 4); (ii) how the components interact; and (iii) the ability of the components and their relationship to positively persist with time in the midst of drivers (see Cumming et al., 2005). A significant approach to examine the system's characteristics is through workshops (focus group discussion in this case), which involve the actors of the water system. The "workshop" findings are to be supplemented by other data collection methods to help explain the system's characteristics (Cumming et al., 2005, Walker et al., 2002). In this study, mapping of interaction among actors took place at two levels. The first level was at the community (operational level), which took the form of FGDs with management staff (WSMTs, operating staff and vendors). As rightly noted by Walker et al. (2002), at this stage, the actors helped to establish important water system characteristics and the status of these characteristics. In other words, this is where the performance indicators, the drivers (see Figure 4.3 in the previous chapter), and how actors are responding to them, emerged.

The second level was characterised by cross level analysis with reference to issues that emerged at the first level. This took place in the regional capital and it involved representatives from the communities (a WSMT member and an operating staff), the DWSTs, Regional CWSA and the Regional Coordinating Council. It was at these levels of interaction that the institutional arrangements and existing management practices were jointly discussed and mapped out. The findings, especially of the regional level focus group discussion, complemented the data from other sources.

[13]Darius T. Mwingyine assisted in the research. He holds an MPhil in land management and lectures in the University for Development Studies. In October 2014, he enrolled as a PhD student in the University of Bonn, Germany.

5.2.6.3 Secondary data (documentation)

The first source of data was through a review of existing documents, including: annual reports of CWSA, financial documents of the WSMTs, audit reports of the WSMTs, minutes of the WSMTs, water production records, constitutions and bye-laws of the WSMTs, water policy documents, and legislative instruments (see Table 5.7 on the distribution of these sources). These are referred to as secondary because they were not produced for the purpose of this particular study (Sarantakos, 1996). They are, however, very useful because they produced a trend of the study variables. Findings from these documentations were triangulated with other sources of data (discussed below) to improve the validity and reliability of the study.

5.2.6.4 Focus group discussion and group discussion

A key qualitative tool which is used in the data collection is focus group discussion (FGD). FGD is similar to group interviews. However, FGD goes further to create interaction and discussion within the group (Sarantakos, 1996, Gray, 2014, Morgan, 1996). However, Morgan (1996:131) cautioned that where group interviews are "conducted in an informal setting with the use of non-directive interviewing, then they are something other than focus groups". With focus groups, it is the researcher that directs the discussions. At the community level, separate FGDs were held with the WSMTs, the operating staff and the vendors, using checklist (see Appendix J). Besides these FGDs, group discussions were held with a youth group and women groups.

A youth group in Gwollu was interested in holding a meeting with the Researcher to discuss the nature of management practices within the water system. This youth group (*"Atey"* Group) has a particular venue (centre of the community) where at any time (day and night), some members are seated. Another group discussion was held in Babile (Bonyiri section) with a women's group (*songtaa nongtaa*[14]*)*. This group was formed by the section to promote their own welfare through monthly cash contribution and peer-support for farming (*kɔtaa*[15]*)* in the rainy season. The stand-post within this section had been closed down because the women refused to draw water from it after they observed price differentiation in vending between sections (see details in section 6.3.3). Additionally, informal discussions were also held with members of two satellite communities (Dawdiyir and Konyukuo) to establish their views on management practices and the satellite communities' participation in water management. The last group discussion was with women in Daffiama, who intercepted the Researcher and his Assistant and as the discussion went deep in water management issues, they opted to be anonymous because sensitive issues were unfolding. Interestingly, these group discussions

[14] Support and love each other

[15] Peer-support farming a form of contract farming whereby a group of individuals support each other in their farming activities on rotational basis. 'For instance, a group of 5 persons named A, B, C, D,& E, would work together on Person A's farm on day 1, then on day 2, they work on Person B's farm, and so on until they end on person E's farm on day 5. Then they repeat in same order of A to E or a different order.'

provided useful information, including financial mismanagement, differential rates for vending and communities meetings, accountability, and transparency in water management. Some of the issues raised during these group discussions were shielded during the main focus group discussion with management staff. Follow-up discussion with management staff after the group discussions confirmed the concerns raised during the group discussions.

Unlike the group discussion, focus groups explore specific set of issues, being "focused" because it involves some kind of collective conversation, with the researcher actively encouraging and being attentive to the group interaction (Kitzinger, 1994, Barbour and Kitzinger, 1999). This study used FGDs because they provide information about content, groups' norms/rules, and provide insight into groups' operations and outcomes, thus giving details of results obtained from household surveys (Bernard, 2011, Kitzinger, 1994). The regional FGD was very useful in explaining the existing water management situation in the region, especially the studied communities. Although FGD, especially the regional FGD, was useful in understanding the basis of the real water-related performance, as noted by Saravanan (2008), there were was no female representative during the regional FGD. This is a reflection of the management structures at the community levels.

FGD has other benefits in relation to the other tools. Besides the low cost involved in using FGD, it does not require that all participants be literate (Kitzinger, 1995, Gray, 2014). High illiteracy is a common characteristic in the study area and this makes FGD relevant: during one of the FGDs with vendors, it was found that none of them were literate. Also, FGD is appropriate for qualitative data gathering. Although Bobby (1977) argued that FGD can be used in both qualitative and quantitative studies, in this study, it was used for qualitative data collection to validate and complement data from other tools. Figure 5.1 shows photographs of the Researcher holding FGDs.

Figure 5.1 FGD with vendors and regional FGD

FGD with vendors in one of the communities.

Regional level FGD with participants from communities, districts, and region.

Source: Field work, 2014

There are varied views on the composition of focus groups (see Morgan, 1997, Sarantakos, 1996, Kitzinger, 1994, Kitzinger, 1995). However, the focus groups in this study ranged from

2 to 7 members, except the regional FGD where participants were more than seven, as shown in Figure 5.1. As noted by Gray (2014), where the focus group is more than six members, tape/digital recording becomes very appropriate. For the safety of the data, a high capacity digital recorder was used to complement the field notes during focus group discussions. However, some of the FGDs opted not to be recorded despite explanation by the Researcher of anonymity of the discussion. Ethically, the Researcher respected their privacy and they were not recorded.

5.2.6.5 Household survey

A household survey used in this study took the form of structured questionnaire which was administered through personal interview. Although the use of questionnaires gives less room for probing, it has an advantage of producing quick, stable, consistent and uniform results as compared to other methods (Sarantakos, 1996, Gray, 2014). Questionnaire surveys are suitable for obtaining quantitative information and explaining the number of respondents who hold a particular view on the issues being studied (Barbour and Kitzinger, 1999). The household survey generated information on a household's perspective on institutions, management practices and performance of the water systems.

The Researcher administered all the questionnaires (see Appendix I for a sample of the questionnaires) and no questionnaire was left behind with the respondents. This is because the pre-test revealed that respondents were interested in giving useful explanation to some of the closed-ended questions. Hence, in order not to lose such valuable information, the Researcher opted to administer all questionnaires. Therefore, contrary to view that questionnaires give less room for probing (Gray, 2014, Sarantakos, 1996), in this study, the Researcher probed certain issues as and when they emerged during the survey. Hence, the administration of questionnaires allowed individual respondents who had case stories to give detail about the management of the water systems.

5.2.6.6 Physical and participant observation

Physical observation of the water infrastructure was carried out in all the communities and in some cases it took the form of a transect walk (see Appendix J for checklist). Observation was either done solely by the Researcher (while administering the household questionnaire) or in the company of management staff. This was to check the maintenance of the infrastructure, presence of exposed and/or burst distribution pipes, state of leakages at the stand-posts and the indoor taps, cleanliness of surroundings of the stand-posts, how fetching of water at the stand-posts was done, and the presence of alternative sources of water (borehole with hand pumps and hand-dug wells). The physical observation generated two main outcomes. First, it revealed the lapses in management of the water infrastructure and it provided opportunity for probing. The follow-ups to discuss and seek answers to some of the observations, especially

at the stand-posts, revealed that some operating staff were not effectively carrying out their duties. Secondly, at the time of exiting the field, some of the leakages had been repaired. This suggests that if there were continuous monitoring of the activities of water management, all staff would live up to their expectations.

During the field work, there was a launching of new water projects, dubbed “Sustainable Rural Water and Sanitation Project (SRWSP)”. The project package for the Sissala West District comprises two small town water systems and 50 boreholes with hand pumps. The Researcher participated actively during the launching of the project to observe (see Figure 5.2) the implementation arrangements for water projects.

Figure 5.2 Photograph of observations made during the research

The Researcher participated and observed the process of replacing a damaged submersible pump in one community.

The Researcher observing how vending is carried out. The stop cock is damaged and water flow is regulated from the meter. See the vendor regulating water flow from the meter. According to the vendor, the stop cock has been out of use for more than three months. This has been reported to the staff and no action has been taken.

A regional CWSA staff presenting an overview of the SRWSP to the beneficiary communities and the District Assembly staff. The presentation provides details on the obligations of all stakeholders in the implementation process.

Beneficiary communities’ representatives, District Assembly staff, the media and the Researcher keenly listening to the presentation from the Regional CWSA.

Source: Field work, 2014

5.2.6.7 Semi-structured interviews

Another qualitative tool used was key informant interviews. According to Bernard (2011), this type of interviewing is appropriate for high-level bureaucrats and other people who will not be available to be interviewed more than once. It is appropriate for this study because besides the researcher’s ability to control the process to minimise biases and distortion, it allows probing which generated detail information on the phenomena being studied (see Sarantakos,

1996, Gray, 2014). Key informants were identified and interviewed using interview guides. The key informant interviews at the community levels were specifically directed towards the community's water system, although the informants could discuss issues beyond their water systems. The key informant interviews targeted knowledgeable persons on the water management, including ex-chairpersons of the WSMTs, retired pump operators and individuals who played major roles during the mobilisation phase of the water projects. Figure 5.3 shows the Researcher holding an interview with a key informant. The regional and national level interviews focused on CBWM in general, however, with reference to Ghana and the Upper West Region. The advantage of key informants, especially on a particular study phenomenon, was to ensure that the validity of information provided by one is cross checked by another, as also indicated by Meyer (2001).

Figure 5.3 Key informant interview in a community

Source: Field work, 2014

During the interviews, effective probing was carried out to extract certain issues that the interview guide (see Appendix J) might not capture. That is, questions emerged from the interviews and some of these questions required follow up discussion with management staff, and this was done during the regional FGD (the last data collection activity).

Table 5.2 Summary of data collection tools and participants

Data collection techniques	Operational level				Regulatory level
	Babile	Busa	Gwollu	Daffiama	
Review of official documents.	• Financial records of the water systems. • Billing records. • Water production and consumption records. • Constitution and bye-laws.	• Financial records of the water systems. • Billing records. • Water production and consumption records. • Minutes of WSMT. • Constitution and bye-laws.	• Financial records of the water systems. • Billing records. • Water production and consumption records. • Constitution and bye-laws.	• Financial records of the water systems. • Water production and consumption records. • Constitution and bye-laws.	• District Medium Term Development Plans. • Annual reports. • Audit reports (Busa and Gwollu). • Operational manuals. • LI 2007. • CWSA Act, Act 564. • National water policy.
Focus group discussion and group discussion.	• WSMT. • Operating staff. • Vendors. • Women group. • Elders of Konyukuo.	• WSMT. • Operating staff. • Vendors. • Women group. • Elders of Dawdiyir.	• WSMT. • Operating staff. • Vendors. • Youth group.	• WSMT. • Operating staff. • Women group.	• Four DWSTs. • Regional level FGD.
Household survey.	n = 37	n = 23	n = 50	n = 40	Not applicable
Physical observation.	• Observation of stand-posts, indoor taps, distribution lines, high level tanks, and official work environment.	• Observation of stand-posts, indoor taps, distribution lines, high level tanks, and official work environment.	• Observation of stand-posts, indoor taps, distribution lines, high level tanks, and official work environment.	• Observation of stand-posts, indoor taps, distribution lines, high level tanks, and official work environment.	• Participation in the launch of new water projects in Sissala West District.
Key informant interview.	1	1	1	1	5

Source: Author's construct, 2015

5.2.7 Data analysis

Data analysis was carried using both qualitative and quantitative techniques. The qualitative analysis was structured in a manner that enabled details about the research to be captured in the analysis. The qualitative data, mostly the field notes, were compiled while the audio recordings were transcribed manually. The output of the field notes and the audio recordings together with other textual materials (see Table 5.2) were subjected to content analysis. Yin's techniques of qualitative analysis facilitated the content analysis. In qualitative data analysis, Yin (2003) provides specific interrelated analytical techniques to be used, especially in analysing case study data. Four of them are useful and were applied in this study. These are: (i) pattern matching (comparing empirically based patterns with predicted/theorised or normative ones); (ii) explanation building (building an explanation about the case by analysing the case data and this sometimes involves some form of narration); (iii) time series analysis (tracing changes in the phenomenon or some indicators over time); and (iv) cross-case synthesis (Yin, 2003:116-143).

In terms of pattern matching, a comparison was made between what is contained in legislative instruments (the normative) and what is mainly practiced on a daily management basis. In other words, there was a comparison between empirical patterns in water management and normative provision in water management. The theoretical framework, especially the rule configuration, served as a heuristic tool for pattern matching. Pattern matching, that is comparing the rules for CBWM as contained in the legal documents as well as those revealed by the actors and how the rules are complied with in daily operation of water systems. As regards explanation building, similarities and differences between the cases in relation to management practices and the selected performance indicators were critically analysed and documented during the write-up stage. Time series analysis was limited to analysis of revenue and expenditure of two cases and a historical account of water supply in the communities. Time series analysis was combined with explanation building to comprehensively understand the basis of the revenue and expenditure patterns of two communities (Busa and Babile) that have the data. Unfortunately, a comprehensive cross-case analysis was constrained by lack of data in the other two communities (Gwollu and Daffiama).

It is important to note that the use of Yin's qualitative analysis techniques were not treated as though they are mutually exclusive. These techniques are relevant to this study because they enhanced internal validity and the cross-case analysis contributed to external validity. During the analysis, the Researcher took into account a vital observation made by Yin (2003), that many researchers centre their analysis at the individual case level and fail to return to cross analysis

among the cases. This is done by selecting cases that are different in some characteristics (discussed in section 5.3.4 below) to necessitate conscious return to cross-case analysis. The household survey greatly facilitated cross-case analysis among the four cases and this was done using Analysis of Variance (ANOVA). As part of the qualitative data analysis, direct quotations from FGDs, key informants and some household respondents were used to convey strong meaning on specific issues in water management.

As regard quantitative analysis, another well-structured process was used. After the pre-test and revision of the research tools, a data entry template was created for the household questionnaire using Statistical Package for Social Scientists (SPSS version 20) (see Appendix B for variable and data view on SPSS). The administered questionnaires were edited and entered into the software for analysis. Some of the questions within the household questionnaires were opened-ended. After the questionnaire administration and editing, the Researcher went through the responded questionnaire to identify common themes from the responses to the opened-ended questionnaire and then similar responses were coded. The SPSS template was then updated to reflect the responses for the opened-ended questions. Subsequently, the responses were entered into the software for analysis. Although the process was a demanding task, it ensured that all responses were coded and entered into SPSS.

From a quantitative perspective, bivariate analysis was used to establish a relationship between some variables that were of interest to the research. ANOVA was used to examine the differences and similarities in households' perception or judgement of CBWM. A lot of cross-tabulation was also done at two main levels: (i) between communities and some set of the variables, which allowed easy case comparison among the variables and (ii) between variables. The outputs of these two levels of cross-tabulation were corroborated with the qualitative results. This kind of analysis greatly improved validity of the results, thus, further justifying the need for mixed methods in examining CBWM.

5.3 The Study Area

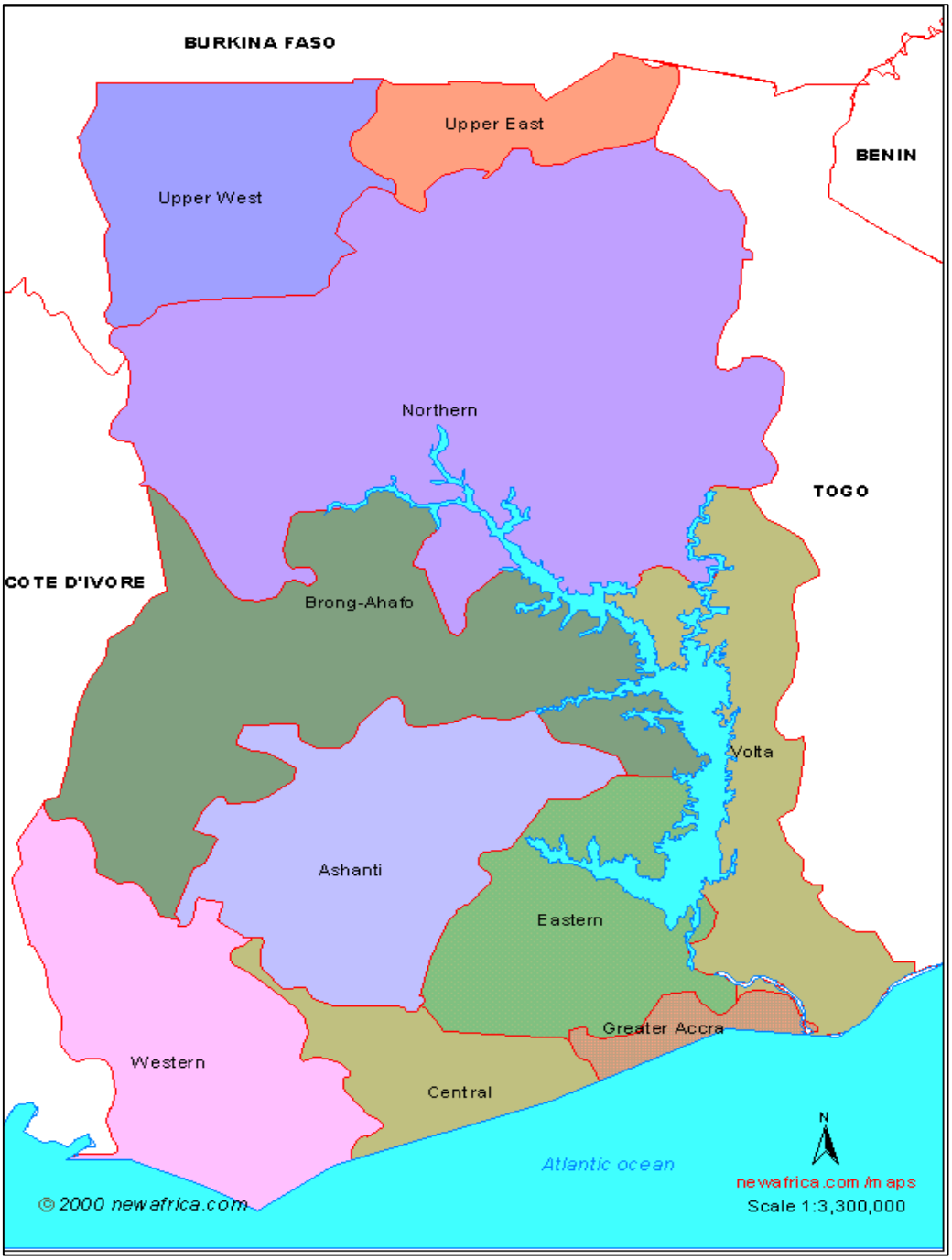
5.3.1 Physical, political and demographic characteristics

Ghana, a West African country and formerly called the Gold Coast, attained political independence on 6th March, 1957 and became the first country in sub-Saharan Africa to attain independence from British colonial rule. Ghana is bordered to the North by Burkina Faso, South by the Gulf of Guinea, West by Cote D'Ivoire and East by Togo (see Figure 5.4). Administratively, Ghana is divided into ten regions (see Figure 5.4) with 216 Metropolitan, Municipal and District Assemblies

as at 2015. In sub-Saharan Africa, Ghana is often pointed to as a positive case of successful political performance and mostly referred to as the beacon of democracy in Africa (Eguavoen, 2008). However, the political success stories started in 1992 after several political upheavals (coup d'état). Although it is not within the scope of this study to investigate the implication of Ghana's past political terrain on water management, it is acknowledged that the political settings have had effects on social services provision, including water. For example, in the 1980s, the military regime having been confronted with an increasing population amidst budgetary constraints and economic reforms, introduced user fees for the water sector, which was met with implementation challenges (see Owusu and Awo, 2013).

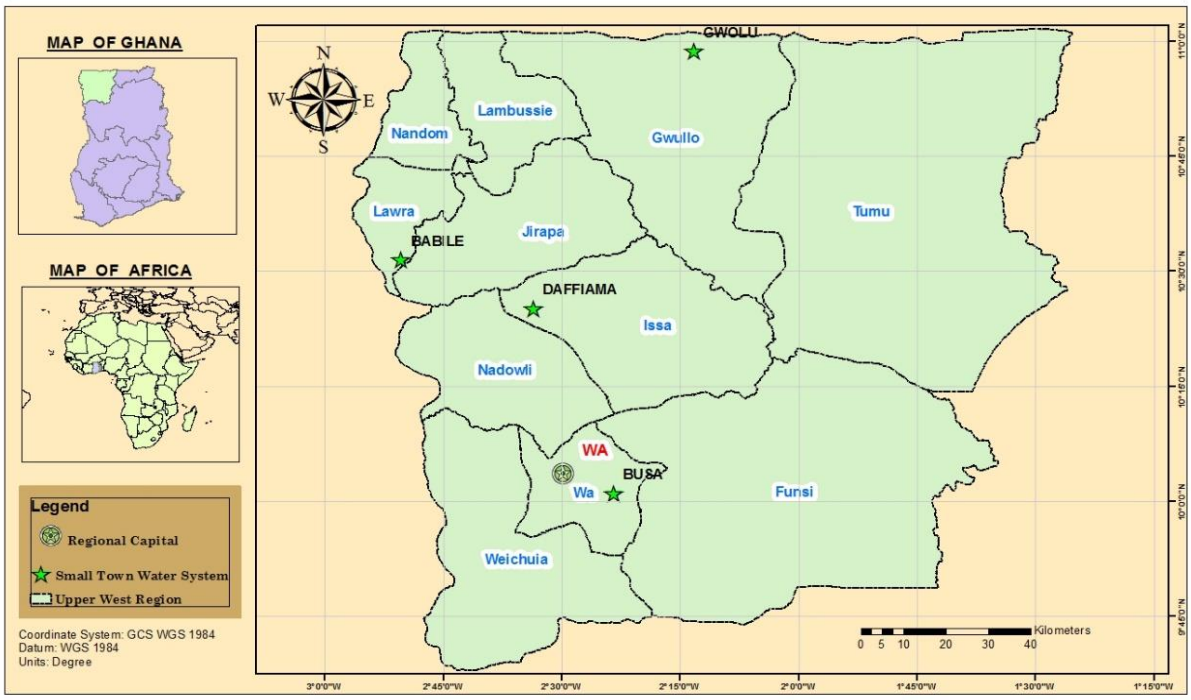
Ghana has several water bodies, including rivers, streams, lakes and lagoons. The most important water body in Ghana, the Volta Lake, is one of the largest man-made lakes (8,482 Km^2) in Africa and it is made up of two rivers (the Black Volta and the White Volta) which flow from Burkina Faso. It is the main supplier of hydroelectricity in Ghana. The lake also serves as means of transport and source of fish for domestic and export purposes. The water bodies can actually be harnessed to contribute to potable water supply in the country. However, this has not been fully realised due to economic constraints amidst limited political commitment. Table 5.3 gives a summary of the Ghana's population, economic, territorial and natural resource characteristics.

Figure 5.4 Administrative map of Ghana



Source: https://www.google.co.uk/search?q=Ghana+maps&client, 20th August 2015

Figure 5.5 Map of the study area in context: Upper West Region



Source: Department of Environment and Resource, University for Development Studies, 2014

Table 5.3 Summarised key characteristics of Ghana

Demographic features, as at 2010	24,658,823 with 48.8% male and 51.2% female. Intercensal growth rate: 2.5%, every 10 years.
Territory	Total area: 239,460km^2 Total land mass: 230,940km^2 Area covered by water: 8,520km^2 (3.56%)
Religious composition	Christians consist of 63%. Muslims 16 % and 21 % of other religion: Traditional and Hindu.
Natural Resources	Timber for domestic and export, minerals such as gold, industrial diamonds, bauxite and manganese for mainly export, fish for domestic and export, petroleum in commercial quantity, silver, rubber and salt.
Sectoral Performance	Agricultural accounts for 39% of total GDP, Services and Industry account for 35% and 26% of total GDP respectively

Source: Constructed from Ghana Statistical Service (2013a), and Eguavoen (2008)

This study focused on the Upper West Region (UWR), one of the ten administrative regions of Ghana and also one of the three regions (Upper West, Upper East and Northern) that constitute Northern Ghana. The UWR covers a geographical area of 18.476 sq. km, which constitutes 12.7% of the total land area of Ghana. Four small towns that have water supply systems have been selected for the study; these are: Gwollu, Daffiama, Babile and Busa (see Figure 5.5).

Gwollu: Gwollu is the District capital of the Sissala West. The Sissala West District was carved out of the then Sissala District in 2004 by the Legislative Instrument, LI 1771. As a district capital, Gwollu hosts a number of public sector organisations, some of which are beneficiaries of the water system. Gwollu is located 32.2km (a 40-minute drive) from Tumu, the nearest major town, where water system spare parts, technical officers, and banking services are located. There are educational institutions, ranging from basic school to Senior High School. The Senior High School has its borehole with a hand pump and, as such, does not depend on the water system. The institutions and their staff which utilise the water system are: Ghana Police Service, District Assembly, Ghana Health Service, District Directorate of Agriculture, and Ghana Education Service. The Ghana Health Service, however, has a limited mechanised water system for the staff and the hospital.

Daffiama: Daffiama was part of the Nadowli District until the Daffiama-Bussie-Issa District was carved out of it in 2012 by Legislative Instrument 2100, with Issa as the capital. However, as at the time of the research, data about the Daffiama water system was obtained from the Nadowli District Water and Sanitation Team (DWST). This is because the new district had no information about the water system. The DWST in the new district was yet to visit the Daffiama water system. Therefore, only for the purpose of this study, Daffiama water system is associated with Nadowli District. Daffiama is 21.3km (a 26-minute drive) from Nadowli and 57.6km (a 50-minute drive) from the regional capital. Spare parts and technicians can be accessed in Wa, the regional capital. Daffiama has educational institutions ranging from basic schools to a Senior High School and a Health Centre. The Mission house and the health centre have limited mechanised water supply systems. However, they use the small town water system occasionally. Although the Senior High School has a borehole with hand pump, there is a stand-post within the school premises to supplement the borehole.

Babile: Babile is part of the Lawra District. The District was created by Legislative Instrument (L.I) 1434 of 1988 (PNDCL 207, Act 462). Babile is located close to the Black Volta, which serves as the boundary between Ghana and Burkina Faso. It is about 19.3km (a 28-minute drive) away from the district capital (Lawra) and 66.2km (a 51-minute drive) from the regional capital. Babile market is one of the international markets, with many traders arriving from Burkina Faso and one of the leading animal markets in the region. This has been a major source of revenue to the District Assembly through taxes. The presence of the irrigation facility has also improved vegetable cultivation, especially in the dry season. This has been a source of employment for households during the off farming period. In terms of education, the community is served with basic

educational facilities and a Senior High School. The community also has a polyclinic and a police post. All these organisations are connected to the small town water system.

Busa: Busa is within the Wa Municipal and it is about 13.9km away from the regional capital, Wa. Busa has no weekly market and due to its nearness to Wa; major trading activities are carried out in Wa. The presence of an irrigation facility has engaged the people, especially women, in dry season gardening. With support from the Ministry of Local Government and Rural Development, and the Canadian International Development Agency (CIDA), Busa is now into commercial fish production. The regional capital is the major source of market for the vegetables and the fish. Therefore, the dry season gardening and the fish production has contributed to household income and food security. In terms of social facilities, the community has only basic schools and a clinic.

The preceding paragraphs show that the four communities are physically accessible to the District capitals and major towns. This is expected to facilitate easy movement of the District Water and Sanitation Teams from the districts to carry out monitoring and supervision and movement of the Water and Sanitation Management Teams from the communities to the district for water-related activities. On the other hand, physical proximity to the regional capital promotes accessibility to spare parts. Moreover, professional technicians can easily be accessed from the regional capital in the event of a breakdown that is beyond the capacity of the operating staff. Therefore, other things being equal, physical accessibility to spare parts outlets and technicians are necessary for continuous functioning of the water systems.

Demographic characteristics: The population density ranges from 13 persons per square kilometre in the Sissala Districts (see Tumu and Gwollu in Figure 5.5) to 97 persons per square kilometre in the Lawra District, with a regional average of 33 persons per square kilometre. Table 5.4 shows the population distribution of the study area. The sparse population distribution has an implication on the cost of distributing water, especially household connections. The sparse population has encouraged compound (extensive backyard) farming in communities. For example, in Babile and Daffiama, where compound farming is practiced, there have been complaints of the effects of farming on water distribution lines, often resulting in burst pipes and leakages.

Table 5.4 2010 Demographic characteristics of the study area in context

Locations	Total	Male	%	Female	%
National	27,043,093**	13,242,709**	49.0	13,800,384**	51.0
	24,658,823	12,024,845	48.8	12,633,978	51.2
Upper West Region	702,110	341,182	48.6	360,928	51.4
Wa Municipal	107,214	52,996	49.4	54,218	50.6
Busa	3,256	1,600	49.1	1656	50.9
Sissala West District	49,573	24,151	48.7	25,422	51.3
Gwollu	4,854	2,445	50.4	2,409	49.6
Nadowli District	94,388	44,725	47.4	49,664	52.6
Daffiama	3,519	1,721	48.9	1,798	51.1
Lawra District	100,929	48,641	48.2	52,288	51.8
Babile	4,061	1,882	46.3	2,179	53.7

Source: (Ghana Statistical Service, 2013b) with **2014 Projected Population Figures

Based on CWSA (2010) categorisation of small towns, the population figures in Table 5.4 show that all the communities are within category I (population between 2,001 and 5,000). Based on Ghana Statistical Services definition of urban areas, none of the communities has attained urban status. However, Gwollu has the potential of attaining an urban status because it is the district capital, which tends to be the centre of population attraction within the district. As population increases, the productive capacity of the water systems will require expansion to cope with demand.

The population structure in Table 5.4 also has a gender dimension. Gwollu is the community where the proportion of males exceeds that of female. The general gender structure, from the communities through the districts to the national levels, shows a high proportion of female population. This implies that any water shortage will affect a greater proportion of the population because females mostly bear the burden of water shortage (see Skinner, 2009). Moreover, the gender structure makes it necessary to integrate women into the decision-making process. This will ensure that the views of the majority (females) are mainstreamed into community level water management.

5.3.2 Economic indices

Economically, Ghana experienced an annual average GDP growth rate of 9.7% from 2010 to 2013, with per capita income rising above GH¢1000.00 in 2007, making Ghana a low-middle income country. In terms of inflation, the average annual non-food rate for the period 2005-2013 was 14.9 percent and has been consistently higher than the average annual food inflation rate of 9.5 percent (Ghana Statistics Service, 2014). Generally, the year-on-year inflation increased from 13.5 percent in December 2013 to 16.9 percent in October 2014 (Government of Ghana, 2014). The increasing inflation has cost implications on management of water systems. This is because it was

established in this study that the main drivers of tariff adjustment are the cost of electricity, spare parts and fuel. The Water and Sanitation Management Teams increase tariffs to enable them meet operation and maintenance costs of the water systems.

The incidence of poverty at the national level has declined substantially over the past two decades from 51.7% in 1991/92 to 28.5% in 2005/2006, indicating that the target of reducing poverty by half (26%) by 2015 could be achieved (Ghana Statistical Service, 2007). Despite the significant decline in poverty at the national level, regional disparities exist. According to the Ghana Statistical Service (2007), the incidence of poverty in the Upper West Region reduced from 87.9% in 1991/1992 to 84% in 1998/1999 and again increased abruptly to 88% in 2005/2006. Whilst there is an on-going debate about the appropriate measure of poverty, it remains largely a rural phenomenon and is synonymous with shortage of income (White, 2008, Zoomers, 2008). Using an upper poverty line of GH¢1, 314.00 per annum (approximately £423.87[16] per annum), the proportion of the population defined as poor in 2012/2013 in Ghana is 24.2% and this represents 6.4 million people. In terms of administrative regions, Greater Accra has the lowest poverty incidence (5.6%) while the Upper West Region records the highest (70.7%) (Ghana Statistics Service, 2014). Northern Ghana continues to remain the poverty-afflicted zone of the country. Using income levels in the above measure suggests that CBWM is constrained by rural poverty in Ghana, as previously established by Laryea (1994).

5.3.3 The water sector in Ghana

Prior to colonialism, chiefs and community elders in Ghana managed water resources (mainly rivers, communal hand-dug wells, ponds, and streams) using their own crafted rules. They institutionalised water management and rules were enforced by the chiefs until the advent of colonialism when these rules began to degrade[17] (Agyenim and Gupta, 2010). The advent of colonialism and modern forms of governance *diminished* the form of water governance practiced by the traditional authorities, where governments, after independence, took over the supply and management of water. The government-led approach was common with water sources such as boreholes with hand pumps and piped water systems.

Therefore, it is worth reiterating that community management is not new but existed in various pre-colonial forms in communities. However, CBWM was limited to rivers, streams and communal hand-dug wells and the extraction of water at the time (pre-colonial era) did not involve any technology. With the advent of technology-based water sources, the current CBWM approach

[16] This is based on 2012 exchange rate of £1=GH¢3.10

[17] With the establishment of British Crown Colony in the present day Ghana the English common law formed part of the laws of Ghana, leading to socio-cultural changes, including changes in the dominance of chiefs and "Tindamba" (custodians of the land in parts of Northern Ghana) in water resource management (Ayenim and Gupta 2010).

requires the establishment of separate community organisations (WSMTs) rather than using the traditional authorities to manage the water systems. This condition is part of a donor requirement in financing water supply and the desire to encourage user participation in decision-making in water management, thus, explaining the absence of direct traditional authorities in CBWM in small town water systems. This is partly because the chief's systems of water governance lacked democracy and equal rights in decision-making (see Ballet et al., 2007) and donors do not like lack of democracy in resource management.

The colonial government in 1928 established the Public Works Department to implement urban and rural water and this operated until in 1948 when the Rural Water Department was created to focus on rural water delivery. A number of structural changes took place in the sector (see Table 5.5). The Ghana Water and Sewerage Corporation (GWSC) was established in 1965 following recommendation by the World Health Organisation which conducted a study into the 1957 water crisis (Owusu and Awo, 2013, Agyenim and Gupta, 2010). However, from 1965 to 1985, not much attention was paid to the rural water supply and, as such, water-related problems (water and sanitation related diseases) were grave in the rural areas. Again, by 1984, about 33% of the water facilities in the country were not functioning due to limited resources to carry out routine maintenance. To overcome this challenge, the Rural Water Department within the GWSC was created in 1986 to focus on the provision of water and sanitation in rural areas (CWSA, 2007a). By 1987 a Five-Year Rehabilitation and Development Plan for the sector was prepared which resulted in the launching of the Water Sector Restructuring Project (WSRP). Multilateral and bilateral donors contributed $140 million to support the implementation of the WSRP (GWCL, 2014).

A number of initiatives were taken to improve the supply of water, especially in rural areas. These initiatives were in line with international level initiatives to ensure adequate access to potable water. The United Nations declared the period 1981-1990 as the International Drinking Water and Sanitation Decade and the aim was to ensure that by the end of the decade, all member countries would have given priority attention to water and sanitation delivery. Hence, the Government of Ghana initiated a review of its policies on water and sanitation provision to keep pace with the changing conditions in the country and on the international scene. After several reforms during the decade (Agyenim and Gupta, 2010, Owusu and Awo, 2013), as shown in Table 5.5, the NCWSP was launched in 1994. The policy of NCWSP is consistent with Ghana's decentralisation policy, which seeks to transfer authority, responsibility and capacity from the Central Government, Ministries and Departments to the District Assemblies. The decentralisation policy is backed by the 1992 Constitution and the Local Government Act, 1993, Act 462 (CWSA, 2007a).

The launching of NCWSP culminated in the creation of the community water and sanitation division (CWSD), a semi-autonomous Unit within the then Ghana Water and Sewerage Corporation (GWSC), to manage rural water and sanitation delivery. After four years of existence, it was deemed necessary to grant complete autonomy to the Division to give greater impetus to its work. Subsequently, the Division was transformed into the Community Water and Sanitation Agency (CWSA) by an Act of Parliament (Act 564) in December 1998, with the mandate to facilitate the provision of safe drinking water and related sanitation services to rural communities and small towns in Ghana.

Table 5.5 Evolution of water laws and policies in Ghana

Year	Departments, Water laws & Policies	Features/Responsibilities
1928	Hydraulic unit of the Public Works Department.	Urban water supply development began with a piped system in Cape Coast
1948	Rural Water Department	Development and management of rural water supply
1958	Water Supply Division (WSD) of Public Works Department	Hydraulic Department and Rural Water Department merged into the WSD to handle drinking water supply for urban and rural
1961	Volta River Authority, Act 46 of 1961	Electricity supply for domestic, commercial and industrial
1965	Water Supply Division under the PWD transformed into Ghana Water and Sewerage Corporation, Act 310	Drinking water supply and sewerage management/services
1969	Water Resources Research; NLCD 293 of 1969	Research in Water Resources
1985	Environmental Action Plan (EAP), A Policy Document	Provided the basis for a strong collaboration between government and NGOs in water and sanitation delivery
1986	Rural Water Department within GWSC	Responsible for delivering water to rural areas
1988	Local Government Law, PNDC Law 207	Decentralisation and governance of local resources
1994	Environmental Protection Agency, Act 490	Regulation/enforcement of environmental implications of water treatment and usage
1996	Water Resources Commission, Act 522 of 1996	Coordination of water resources management
1998	Community Water and Sanitation Agency, Act 564 of 1998	Facilitate the provision, regulation and management of rural and small town water delivery
1999	Ghana Water Company Limited (GWCL), Act 461 of 1999 as amended by LI 1648	GWSC converted into a limited liability company with responsibility for Urban water delivery
1999	Public Utility Regulation Commission, LI 1651	Regulation of mainly urban utilities
2001	By-laws of WSDB and WATSANs	Regulation of the operation of small town water systems
2005	CWSA Policy Guidelines	Water facilities management, services provision, quality and tariffs in rural and small town.
2005	Private operator Contracted for Urban water management	Aqua Vitens Rand was contracted for a five-year management of urban water supply.
2007	National Water Policy	Coordinated management of water resources; water as an economic good.
2009	Change in status of 5% capital contribution	Announcement of abolition of community contribution to capital cost of rural and small town water projects

Source: Constructed from Agyenim and Gupta (2010), Water and Sanitation Program (2011)

The CWSA has since been facilitating the implementation the NCWSP using the decentralised structures at the district and community levels, as prescribed in Act 564. The NCWSP has three interrelated objectives as follows:

i. To provide basic water and sanitation facilities to communities that will contribute towards the capital cost and pay the operations, maintenance and repair costs of their facilities;

ii. To ensure the sustainability of these facilities through community ownership and management, community decision-making in their design, active involvement of women at all stages in the project, private sector provision of goods and services and public sector promotion and support; and

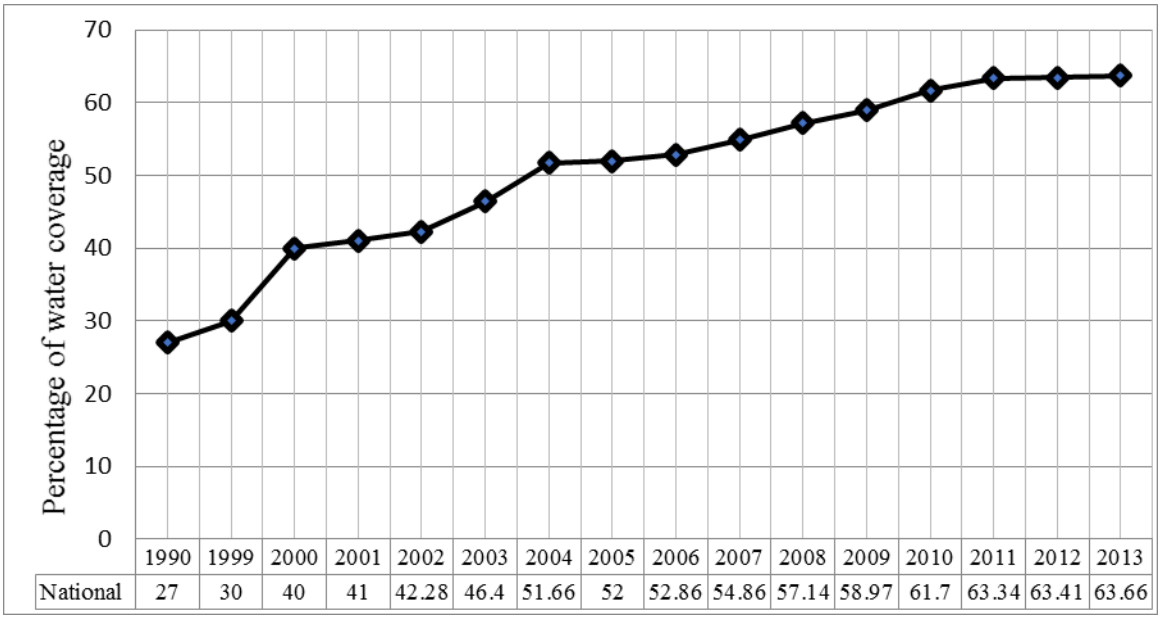
iii. To maximise health benefits by integrating water, sanitation and hygiene promotion interventions, including the establishment of hygiene promotion, and latrine construction capabilities at the community level (CWSA, 2014d).

In order to achieve these objectives, the policy hinges on community ownership and management of the facilities installed in the beneficiary communities and at times the use of private sector to support the management process. Its implementation is done by the District Assemblies through their District Water and Sanitation Teams (DWSTs). The financing arrangement of water facilities is as follows: external support agency - 90%, District Assembly (Government of Ghana) - 5% and the beneficiary community – 5% (CWSA, 2007a). This was prior to 2009. As shown in Table 5.5, the government in 2009 abolished the capital contribution required of communities. Studies have already established that the outright abolishment of the community contribution has reintroduced paternalism within the sector because communities that have the ability and will to pay, now look to government even to finance operation and maintenance expenditure (Water and Sanitation Program, 2011).

5.3.3.1 Achievement of the NCWSP

Within nineteen years of implementing the NCWSP, there has been significant acceleration in the delivery of water and sanitation facilities to rural communities and small towns in Ghana. As at the end of December 2013, 574 newly constructed piped systems were delivered. The period also witnessed a dramatic rise in the construction of point sources for rural communities. From 1994 to December 2013, about 25,135 boreholes have been delivered by CWSA and her Development Partners to beneficiary communities. These are made of 15,231 newly constructed, 4,232 rehabilitated and 4,230, converted boreholes. In addition, 1,553 new hand-dug wells were constructed whilst 100 were rehabilitated within the period (CWSA, 2014c). Figure 5.5 shows the composite trend of rural and small town water coverage in Ghana, while Table 5.6 shows the coverage of water supply in the Upper West Region and the four districts where the study was conducted.

Figure 5.6 Trend in rural and small town water coverage



Source: Constructed from; CWSA (2014b), NDPC (2011)

Table 5.6 Water coverage in the study area

Region/District	2009	2010	2011	2012	2013
Upper West	76.87	77.73	77.73	76.61	76.13
Nadowli District	80.4	80.04	80.04	78.79	78.39
Lawra	91.75	91.58	91.58	90.86	90.61
Wa Municipal	57.34	62.66	62.66	60.68	60.06
Sissala West	85.14	84.84	84.84	85.08	84.77

Source: Annual Progress Reports of UWR CWSA (2010-2013).

As shown in Figure 5.6, the national coverage for potable water supply in both rural communities and small towns increased from 27% in 1990 to 63.66% as at the end of December 2013. There was a sharp increase from 1990 to 2009, and a steady increase from 2010 to 2013. This is due to the support of donors including the World Bank, Canadian International Development Agency (CIDA), and Japan International Cooperation Agency (JICA), and NGOs. There are regional variations in water coverage. Although the Upper West Region has high poverty, it has the highest coverage in rural and small town water coverage. Statistics available (see Table 5.6) showed that there has been stable water coverage in the region, with district variations.

In conclusion, the water sector has gone through several reforms. The essence of many of the reforms in the water sector is to ensure full cost recovery in urban areas while in rural areas and small towns, the target is to meet cost of operation and maintenance using user charges (Water and Sanitation Program, 2011). The next section presents the mode of providing small town water systems. It focuses on the sources of funding and the implementation process.

5.3.3.2 Mode of delivering water in small towns

The water sector, especially in Northern Ghana, has received donor support since independence. Prominent effort to supply water to the area was a joint GWSC and CIDA intervention which provided water to rural areas (Eguavoen, 2013, Fuest, 2006). From the 1990s onwards, the World Bank has been one of the main sources of financing water supply in North-western Ghana. Specifically, the water systems (the four cases) were provided through the collaboration of the World Bank, the Government of Ghana, the respective District Assemblies and the beneficiary communities.

The provision of these water systems is part of Community Water and Sanitation Programme (CWSP2). The objective of the first phase of the CWSP2 (2000-2004) was to increase service coverage and achieve effective and sustained use of improved community water and sanitation services in villages and small towns in four regions in Ghana (World Bank, 2005). Phase 2 of the CWSP is the Small Town Water Supply and Sanitation Programme. The objective of this phase is to increase access to small towns' water supply and sanitation services in six regions (Ashanti, Brong-Ahafo, Upper East, Upper West, Central, and Western) within a four-year period. A total of 500,000 and 50,000 people were to benefit from water supply and sanitary facilities, respectively, in 73 small towns within these regions (World Bank, 2011). Therefore, whereas the second phase of the CWSP2 focused on small towns, the first phase included rural communities.

The provision of water systems goes through a structured process, which is summarised in the following steps. The first step is for the District Assemblies (DA) to inform communities on the water projects that are available within the districts. The communities who are interested in water services submit an application after a wider consultation with the community members. These applications are reviewed. Then small towns are selected by the DA based on criteria that include: (i) the level of poverty; (ii) existing water and sanitation facilities; (iii) existing water-related disease; (iv) number of self-help projects completed in the last five years; (v) provisions in the district-development plans; (vi) expressed willingness of community members to assume full responsibilities for operation and maintenance, including replacement of assets, at the end of their useful life, of the water systems; and (vii) documentary evidence that the proposed site for the water system belongs to the community, (CWSA, 2014d, World Bank, 2010). The successful communities are informed and they sign a Community Water, Sanitation and Hygiene (WASH) Project Agreement with the District Assembly. This paves way for the contracting and construction of the water infrastructure. During construction, community development activities, including: WSMT training, hygiene and sanitation promotion, and financial mobilisation are carried out. They are implemented through Technical Assistance. Upon completion, the WSMT adopts a

constitution and it is inaugurated, and the all WSMT members are recognised by the District Assembly (CWSA, 2014d). During the implementation, the DWSTs carry out monitoring and report to both the District Assemblies and the CWSA.

The previous International Development Association (IDA)-financed project required a contribution of 10 percent to the capital cost of water facilities: 5 percent to be contributed by the community and another 5 percent by the corresponding District Assembly. However, since the Government of Ghana issued a policy statement embedded in the 2009 Budget abrogating the principle of a 5 percent community contribution, only the 5 percent District Assembly contribution remains effective (World Bank, 2010).

5.3.4 Characteristics of the small town water sector

As at the end of 2013, the Upper West Region had 17 small town water systems (STWSs), of which eight are located in district capitals. Of the 17 STWSs, nine were constructed before the water sector reforms in 1994. Five out of the eight STWSs that were constructed after the reforms were completed and handed over to communities in 2010. According to the Regional CWSA annual report, the Board of Directors of the CWSA paid a working visit to STWSs in the Region and found that the Busa water system was well managed. This was based on observation of the water system, including proper documentation of management activities, minute keeping and functioning of all stand-posts. The Board of Directors' assessment was based on documentations and the views of water users were not factored into the judgment. Nonetheless, the Board of Directors urged other WSMTs in the region to have exchange visit with the Busa WSMT to learn from them (CWSA UWR, 2012).

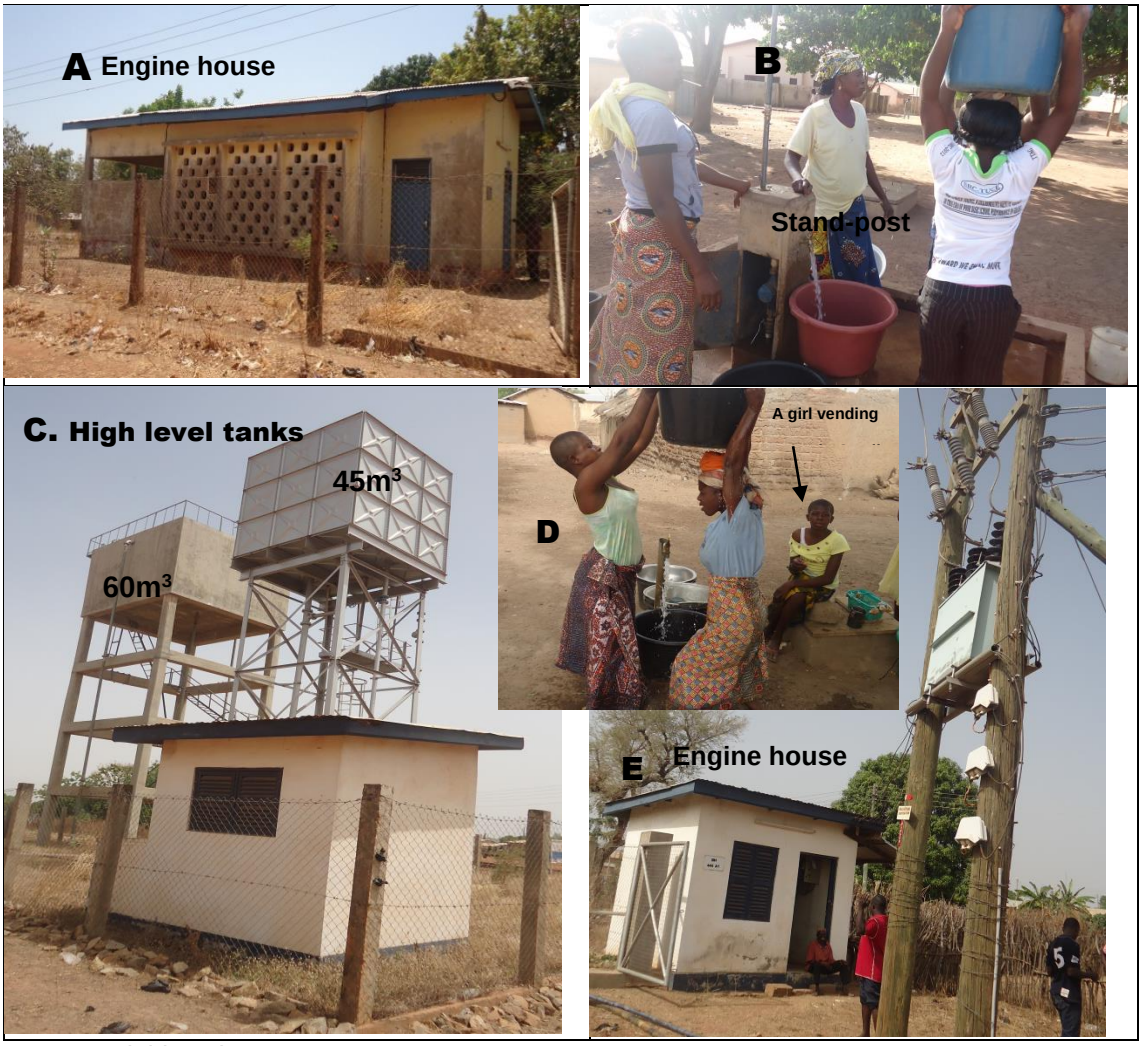
Ethnic groups: There are three major ethnic groups; Waala, Dagara and Sissala, in the region. The four sampled STWSs have distinct characteristics. The selection of cases cut across all the major ethnic groups. It has been established that water systems are exposed to a set of factors (see Harvey and Reed, 2006a, Harvey and Reed, 2004, Carter et al., 1999), including socio-cultural. Busa STWS falls in the Waala ethnic group in the Wa Municipal. Babile and Daffiama STWSs are located in Lawra and Nadowli Districts respectively where we have the Dagaaba ethnic group. The Gwollu STWS is located in the Sissala West District. Whereas there tends to be socio-cultural uniformity within the same ethnic groups (even in different locations), there is variation across ethnic groups. That is, socio-cultural practices within an ethnic group, even in different geographical locations, are similar but there is significant difference across ethnic groups. However, this variation is not reflected in CBWM of the small town water systems. Apart from the

ethnic characteristic of the STWSs, they were established in different periods under different conditions.

Timing: Daffiama and Gwollu have been twins in terms of water supply history. In each community, the first borehole was constructed in the 1950s. Prior to the construction of boreholes, the main sources of water in these communities were rain water harvesting, hand-dug wells and ponds. The process of mechanisation of the boreholes in both communities started in 1968 and completed by 1970. An electro-submersible pump was installed and powered by diesel genset. Picture A in Figure 5.7 shows the engine house in Daffiama. Gwollu has a similar building for the genset. Steel water reservoirs (high level tanks) were constructed to store water for distribution to the consumers through public stand-posts as shown in Figure 5.7. In each community (Daffiama and Gwollu), the storage capacity of the steel reservoir is $45m^3$. With the first ever piped water supply in the history of the communities, a key informant indicated that there was maximum utilization of water because consumers were enthusiastic to use the water from the system. They also made efforts to pay the water fees.

During this period, the Ghana Water and Sewerage Corporation (GWSC) was responsible for water delivery. Pump operators were employed by the GWSC and the District Council to manage the water systems. The operators were paid by the government and at the beginning the government supplied the diesel for the running of the genset. The stand-posts were the main sources of revenue generation. Revenue mobilisation was not so much a challenge because the communities were small in size, and the operators also had the support of the traditional authority, the most revered community level institution. The traditional authority supported in enforcing rules on payment of water fees. This was the practice until the policy reform within the water sector.

Figure 5.7 Nature of small town water systems in the study area



Source: Field work, 2014

During the policy reforms, the water systems in Gwollu and Daffiama were part of the countrywide water systems which were transferred from GWSC to the District Assemblies for community management. From this period (1994), the communities assumed full responsibility for the water management, with the District Assemblies providing complementary functions. As the population increase, there was the need for expansion. As such, another borehole was constructed and mechanised to supplement the existing one in Gwollu, while Daffiama continued to rely on one borehole for water production. The communities relied on these water systems with intermittent breakdowns until the Government of Ghana secured support from the World Bank to rehabilitate and expand the water systems. The rehabilitation and expansion completed in 2007 and the water systems were handed over to the communities for management in 2008. As part of the expansion, each community had an additional $60m^3$ HLT and one mechanised borehole. Thus, at the time of the research, each community has a total of $105m^3$ capacity of water storage (see Picture C in Figure 5.7). Whereas the two pumps in Daffiama are functional, two out of the three pumps in

Gwollu are functional. When the two communities were connected to the national grid (hydro-electricity), the communities switched from genset to hydro-electricity for water production.

Besides the water systems, Gwollu has two functional boreholes with hand pumps and two public hand-dug wells. There are also households' hand-dug wells and a private mechanised water supply system with limited distribution. Daffiama has three public boreholes with hand pumps which are located in different sections of the community. These public boreholes are managed by the respective sections. Beneficiary households pay a monthly levy towards maintenance. Additionally, Daffiama has an irrigation dam of about 13 hectares of irrigable land (IFAD, 2006). The dam also serves as a source of water for construction and watering animals.

Babile and Busa also share similar characteristics of water supply. The water systems in these communities were commissioned in May 2010. Each community has a $60m^3$ capacity concrete HLT (similar to Picture C in Figure 5.7), two mechanised boreholes and office accommodation. They use hydro-electricity to power the electro-submersible pump for water production. Prior to the construction of the water systems, these communities relied on borehole with hand pumps and hand-dug wells for their water needs.

Busa has only one public borehole with hand pump and another borehole for the clinic. As such, the community basically depend on the water system for multiple water uses. Babile has eight boreholes and six hand-dug wells fitted with pumps. Out of these facilities, seven of them function throughout the year while four do not function at all. Three facilities function seasonally. That is, water is only available during the rainy season when the water table is high. During the dry season, the humidity reduces and the rate of evapo-transpiration increases with the presence of the dry wind (harmattan). This reduces the ground water, which is signified by drying up of ponds and poor yield of hand-dug wells.

The Babile polyclinic borehole with hand pump, although it was provided by Danish International Development Association (DANIDA), is not accessible to the public and the polyclinic is responsible for its maintenance. Two of the functional boreholes belong to the Babile Livestock Breeding Station[18]. In Babile, there are household hand-dug wells, although some of them are seasonal. The high number of water sources in Babile improved access to water. However, the presence of many alternative sources results in reduced dependence on the water system. This

[18] The Station, previously known as the Babile Agriculture Station, is part of the National livestock Services Project. It is funded by the World Bank and the Government of Ghana. It seeks to carry out breeding improvement of pigs.

implies a reduction in revenue while some expenditure components, such as salary of operating staff do not reduce, thus leading to inefficient financial performance.

In addition to the above sources of potable water, Babile and Busa have irrigation dams. The Busa dam was constructed in 1956 and was rehabilitated in 1997 with financial support from the International Fund for Agricultural Development. It has an irrigable area of 10 hectares. The Babile dam was constructed in 1988 and was also rehabilitated in 1999 with an irrigable area of 4 hectares (IFAD, 2006). Besides irrigation, the facilities also serve as sources of watering animals and water for construction. Access to water for construction is not regulated for residents of the communities. The irrigation facilities and the piggery are poverty reduction measures, which seek to improve the income of farmers. An improvement in farmers' income is expected to improve other aspects of the households' life, including their ability to pay for water services.

There are three main points or outlets where individual can access water in all the small town water systems, namely: (i) household/private connections; (ii) public stand-posts to serve those without private connections; and (iii) institutional[19] connections as shown in Table 5.7.

Table 5.7 An overview of water distribution in the case communities

Water facilities	Babile	Busa	Gwollu	Daffiama
Private connections	92	3	145	141
Public Stand-posts	7 in Babile town 2 in Brifo 2 in Konyukuo	7 in Busa town 2 in Biihe 1 in Dawdiyir	13	11
Institutional connections	Polyclinic, Senior High school and Agricultural extension station	No institutional connection.	Police station, District Assembly Administration and the District Hospital	Daffiama Senior High School, clinic and the catholic church
Boreholes with hand pumps	8	2	2	3
Irrigation facility	1	1	None	1

Source: Fieldwork, 2014.

All the stand-posts that were constructed as part of the project package have concrete pads and effective means of disposing spilt water (soakaway) (see Picture B in Figure 5.7). After handing over the water systems to the communities, the WSMT in Gwollu was able to add three stand-posts to the existing ten stand-posts. However, the three stand-posts were not constructed to meet the standards. That is, concrete pads and soakaways were not constructed to ease disposal of spilt water (see Picture D in Figure 5.7). As a result, the surroundings of these stand-posts,

[19] The CWSA Legislative Instrument, LI 2007 of 2011 explained "Institutional connection" to mean direct piping of water to an entity other than a household.

according to the vendors, turn muddy. This is common during the rainy season and peak fetching period, potentially contaminating the water because of households' use of open containers (see Pictures B and D in Figure 5.7).

5.4 Conclusion

This chapter presented two broad areas. The first part presented the research methodology which detailed the paradigm of this research and how data was collected and analysed. From the foregoing sections, it is clear that in research methodology, be it qualitative or quantitative, the central theme is the need for a well-thought journey towards gathering and analysing data on a particular phenomenon. From the various perspectives on research design, there is neither a good nor a bad research design or paradigm. Rather, it is the problem of investigation that determines whether qualitative, quantitative or mixed methods should be applied. From a careful analysis of varied viewpoints from authors and the nature of the study, this research adopted mixed methods because it draws on the strengths of the extremists (qualitative-quantitative divide), such that weaknesses in one are offset by the strengths of the other. Such an approach was able to greatly unearth the performance of the water systems and the reasoning behind the state of that performance. The second part centred on the study area and how the water sector in Ghana has evolved over the years. The subsequent chapters present the results of the research.

6 Analysis of the water systems' performance

6.1 Introduction

This chapter presents the data analysis on the performance of the water systems. It starts with the characterisation of the respondents in this study, followed by a presentation of the state of the performance indicators of the water systems. The key areas of performance assessment include: (i) financial inflows and outflows; (ii) water revenue efficiency; (iii) knowledge and information sharing on water management; (iv) user satisfaction with water services and management activities; (v) water loss management; and (vi) performance in community level governance (participatory decision-making) as well as ownership and control over the water systems. Following an analysis of these components, the chapter ends by exploring, from the customers' perspective, the success state of community-based water management in their respective communities.

6.2 Background of respondents and water demand

6.2.1 Household size and household monthly bill

The average household size, based on the household survey, of the four communities is 6.7 (see Table 6.1). The average household size in this study is the same as the average household size in rural areas of the Upper West Region, but higher than the average rural household size (5) in Ghana (Ghana Statistical Service, 2013a).

Table 6.1 Household size

Community	Mean	N	Std. Deviation
Babile	6.9730	37	2.16649
Busa	8.3478	23	2.03623
Gwollu	5.8000	50	2.67261
Daffiama	6.6750	40	2.55591
Average	6.7133	150	2.55237

Source: Field work, 2014

In terms of variation, the ANOVA results [F (3, 146) = 5.948, P = 0.001] show that there is significance mean difference in household composition across the communities. Busa has the highest household size while Gwollu has the lowest household size. This is because Busa is predominantly a Muslim community, where polygamy is mostly practiced. Although Daffiama is predominantly a Christian community (see religious composition in section 6.2.3 below) it has a higher household size than Gwollu, which has a mix of religious composition. It is expected that large household size would demand large quantity of water and, as such, incur higher water bills. Consequently, the households' monthly bills were computed to establish a relationship between

the two variables (household size and household monthly bills). On average, the households' monthly bill is GH¢22.19, with the highest in Babile and the lowest in Gwollu (see Table 6.2) (Gh¢1=£0.23).

Table 6.2 Distribution of household monthly bills

Community	Mean	N	Std. Deviation	Minimum	Maximum
Babile	Gh¢28.45	37	Gh¢24.02	Gh¢3.00	Gh¢125.00
Busa	Gh¢22.15	23	Gh¢17.35	Gh¢9.00	Gh¢85.00
Gwollu	Gh¢16.50	50	Gh¢9.91	Gh¢2.25	Gh¢55.90
Daffiama	Gh¢23.54	40	Gh¢15.87	Gh¢3.00	Gh¢85.00
Average	Gh¢22.19	150	Gh¢17.41	Gh¢2.25	Gh¢125.00

Source: Field work, 2014

As shown in Table 6.2, Babile and Daffiama have the highest mean water bills and a wide standard deviation, meaning that there are wide variations within the communities in terms of households' water bills. Using Pearson's correlation, the analysis shows that there is a weak positive relationship (r = 0.123) between the household size and the monthly bills. That is, a monthly water bill is not strongly influenced by the size of a household: an increase in household size marginally increases the monthly water bill. The coefficient of determination (r^2=0.015) shows that 1.5% of the monthly bill is explained by the household size and the remaining 98.5% is attributed to other factors. It is established that households use the water for various commercial purposes such as brewing of "Pito" (locally brewed alcoholic drink), washing of vehicles (washing bay) and food vending. These activities consume large quantity of water and do not depend on the household size. The ANOVA results of water bills across the communities show that the mean difference is significant, F (3, 146) = 3.636, P = 0.014. Apart from the differences in water tariffs among the communities (presented in subsequent sections), the category of water usage also explains the difference. Pito brewing is prominent in the Christian communities (Babile and Daffiama) and they mainly depend on the piped water for brewing. This partially creates differences in monthly water bills across the communities.

6.2.2 Sex, age and marital status of respondents

Table 6.3 shows the sex, age and the marital status of household respondents. Averagely, 53.3% of the household respondents were females while 46.7% were males. Based on the ANOVA results, F (3, 146) = 7.854, P =0.000, there are significant variations among communities in terms of gender composition of respondents. As shown in Table 6.3, 77.5% of the respondents in Daffiama were females while 22.5% were males. Although the difference was partly due to sampling (random), the relatively high proportion in Daffiama is also attributed to division of responsibilities over utilities, and generally, the active role of women in water services delivery at the household levels. In some households in Daffiama, men are mostly in charge of payment of the electricity bills while women are responsible for water bills and water-related activities.

Similarly, in Busa women constituted 69.6% of the household respondents. There was a strong female role during the mobilisation phase of the water project in Busa, in which women gathered stones and shea nuts to sell in order to raise money for the community's contribution towards the capital cost.

Table 6.3 Age and marital status of household respondents

Sex	**Babile**	**Busa**	**Gwollu**	**Daffiama**	**Average**
Male	56.8%	30.4%	66%	22.5%	46.7%
Female	43.2%	69.6%	34%	77.5%	53.3%
Age	**Babile**	**Busa**	**Gwollu**	**Daffiama**	**Average**
20-30	21.6%	30.4%	18%	22.5%	22%
31-40	27.1%	21.7%	54%	20%	33.3%
41-50	37.8%	39.2%	14%	10%	22.7%
More than 50	13.5%	8.7%	14%	47.5%	22%
Marital Status	**Babile**	**Busa**	**Gwollu**	**Daffiama**	**Average**
Married	75.7%	91.3%	90.0%	72.5%	82.0%
Single	16.2%	8.7%	6.0%	7.5%	9.3%
Divorced	2.7%	0%	2%	0%	1.3%
Widowed	5.4%	0%	2%	20%	7.3%

Source: Field work, 2014

As regards age, there is a fair distribution of respondents across the age cohorts (see Table 6.3). This implies that the views of all age groups in respect of water management were captured in the study. As shown in Table 6.3, 82% of the respondents were married with only 1.3% as single. Although 1.3% (representing 14 households) are single, about 92.8% of them have at least a household size of three. In other words, although they are single (not married), they have other household members. Another 7.3% of the respondents are widows and the majority of them are in Daffiama. Given that there is a division of responsibilities over utilities in Daffiama, the presence of a significant number of widows can affect their payment of water bills because they (widows) take absolute responsibility over water bills in addition to electricity bills.

6.2.3 Religious composition of respondents

In terms of religious composition, all the household respondents in Busa are Muslims while in Daffiama, all the respondents are Christians. In Babile, 64.9% of the respondents were Christians and 29.7% were Muslims (see details in Table 6.4 below). This implies that dissemination of information to customers can be faster since there are converging points for the general public; that is the churches and mosques. Gwollu had the reverse, where 8% of the respondents were Christians and 88% were Muslims, with the rest constituting Traditionalists[20].

[20] Traditional religion refers the beliefs and practices, including belief in a supreme creator, belief in spirits and veneration of ancestors. Practitioners of traditional religion, as used in this study, are neither Christians nor Muslims.

Table 6.4 Religious composition of household respondents

Religion	Babile	Busa	Gwollu	Daffiama	Average
Christian	64.9%	0%	8%	100%	45.3%
Islam	29.7%	100%	88%	0%	52%
Traditional	5.4%	0%	4%	0%	2.7%

Source: Field work, 2014

At the management level, all the management staff in Busa are Muslims while all the management staff in Daffiama are Christians. In Gwollu, although there is a religious mix, all the water and sanitation management team (WSMT) members and the operating staff are Muslims and a one vendor is a Christian while the rest are Muslims. In Gwollu, the Christians are mostly the non-natives (new settlers) of Gwollu and are obviously absent in water management, where the Muslims and the Traditionalists are mostly the original settlers. In Babile, all the operating staff are Christians while there is a mix of religion in the WSMT and the vendors. In Babile, the Muslims are the new settlers while the Christians and the Traditionalists are the original settlers. Although religious factors can affect gender participation in community-level decision-making, the analysis (see section 6.5.2) shows that limited participation in on-going management decision-making process is not related to religious factors.

6.2.4 Occupation and educational level of respondents

The main source of livelihood in the four communities is farming (see Table 6.5) for 55.5% of the household respondents. Only 19% of the respondents are employed in the public sector, with majority of them in Gwollu. This is partly because Gwollu is the district capital which comes with many government departments. Besides farming and public service, petty trading and small scale industrial activities constitute the next major source of livelihood.

Table 6.5 Occupation of household respondents

Occupation	Babile	Busa	Gwollu	Daffiama	Average
Farming	40.5%	82.6%	54%	45%	55.5%
Commerce/small scale industrial	24.3%	13%	10%	27.5%	18.7%
Vehicle operator	10.9%	4.4%	2%	0%	4.3%
Construction	0%	0%	0%	10%	2.5%
Public Service	24.3%	0%	34%	17.5%	19%

Source: Field work, 2014

In Gwollu, all the Executive Committee[21] members of the WSMT (although currently dysfunctional) are not engaged in any formal sector employment. In Busa, besides the secretary, who is a public servant, the rest of the executive committee members are retirees and easily accessible in the community. On the contrary, all the executive committee members in Babile and Daffiama are actively engaged in the formal sector, which has affected their availability to perform water related functions. In Babile, operating staff are not allowed to take up other job appointments. In contrast, all the operating staff in Gwollu are employed in government departments within the community. In Busa and Daffiama, the operating staff are not engaged in the formal sector but there is no rule to prohibit them from engaging in other employments. These variations demonstrate the independence of the communities in regulating the composition and functions of the operational level management staff.

With regard to educational level, an average of 38.7% of the respondents in the four communities do not have any form of formal education. Busa has the highest level of illiterates, with the least in Babile. The detailed educational levels of the household respondents are presented in Table 6.6.

Table 6.6 Educational level of household respondents

Educational Level	Babile	Busa	Gwollu	Daffiama	Average
No formal education	29.7%	60.9%	36%	37.5%	38.7%
Primary education	24.3%	17.4%	12%	10%	15.3%
Junior high school/Middle school	13.5%	17.4%	14%	25%	17.3%
Vocational/technical	0%	4.3%	2%	12.5%	4.7%
Secondary	21.7%	0%	14%	5%	11.3%
Training college	2.7%	0%	2%	10%	4%
Tertiary	8.1%	0%	20%	0%	8.7%

Source: Field work, 2014

An average of 4% of respondents had teacher or nursing training. In Gwollu, 20% of the respondents have tertiary education (university or polytechnic degree). In Busa, there was no household respondent who had secondary, training college or tertiary education. Although the household survey was based on a random sample, the characteristics of the communities partly explain the variations in educational levels. Gwollu and Daffiama are urbanising with skilled labour migrating into the communities, especially Gwollu (District capital). Busa is typically a farming community and relatively rural: explaining the high proportion of illiterate. Formal education of customers is important in enhancing information dissemination on water management provisions.

[21] The Executive Committee is made of the Chairperson, Treasurer, Secretary, Technical Coordinator and any other member.

Irrespective of the educational level and occupational status, access to water is expected to be unrestricted to any level of people.

6.2.5 Access to water

The distance covered and the time spent to access water was limited to households who use the stand-posts. By standard, a water delivery point (stand-post) should not be located more than 500 metres from a house (CWSA, 2011). That is, a household should not have to travel beyond 500 metres to access water. Table 6.7 shows the distance covered and the time spent in fetching water.

Table 6.7 Distance covered and time spent to access water

Distance to stand-posts	Babile	Busa	Gwollu	Daffiama	Average
Less than 250m	64.3%	52.4%	77.3%	37.5%	61.5%
250-500m	28.6%	47.6%	22.7%	50%	35.4%
501-750m	7.1%	0%	0%	12.5%	3.1%
Time spent in fetching water	**Babile**	**Busa**	**Gwollu**	**Daffiama**	**Average**
Less than 30min	86.7%	71.4%	72.7%	62.5%	75.4%
31-60min	13.3%	28.6%	27.3%	37.5%	24.6%

Source: Field work, 2014

From Table 6.7, majority of the households are within the acceptable range in fetching water. Only 7.1% of households in Babile and 12.5% in Daffiama travelled beyond 500 metres to access water. This is partly due to the dispersed settlement pattern in these communities in relation to Gwollu and Busa. Secondly, some sections in Babile and Daffiama do not have functional stand-posts and, as such, are required to travel to other sections to fetch water. This study went further to assess the time spent in fetching water. The majority of respondents (75.4%) spent less than 30 minutes, especially in Busa and Gwollu, and this is influenced by the settlement pattern, which has implications on the location of stand-posts. These two communities are Muslim dominant and have clustered settlements, unlike Babile and Daffiama. Clustered settlements facilitate siting of stand-posts because it is easy for households to arrive at a consensus on siting, as indicated by management staff.

6.2.5.1 Equity in access to water

Access to water in the four communities is not physically restricted to particular sections. That is, all sections of the communities have at least a stand-post and “a distribution point for private connection” (DPPC) to facilitate private connections. However, actual access to water by a household depends on the ability to pay for water services either through pay-as-you fetch or private connection by the household. Given the mode of real access to water there are people,

especially the aged, who genuinely cannot pay for the water services. That is, although the stand-posts are physically within the reach of majority of households, there are some people who by virtue of their conditions (aged) cannot access water. This is significant because the major source of income for many households is peasant farming. The study also examined the provisions made for such people. In all the communities there is no specific provision for them. According to the WSMTs, the poor, especially the aged, are staying with relatives and although there are no specific provisions for them, relatives of the indigent are ready to take responsibility for them. As a result, households do not want their aged or physically challenged to be seen as being cared for by society.

The Researcher could not sample the aged to ascertain the validity of the management staff assertion. However, during the household survey, an elderly woman was spotted drawing water (see Picture in Box 6.1) and the Researcher sought to establish the basis of her drawing water from an unprotected well, when there are public stand-posts close by. After exchanging greetings with her, the Researcher proceeded to find out why she fetched water from the well. Box 6.1 presents the output of the dialogue. The interview took place in Gwollu. As at the time of this interview, one of the two submersible pumps of the water system had broken down. This resulted in severe water rationing.

Box 6.1 Dialogue with an elderly woman drawing water from a hand-dug well

Interviewer: Are you drawing water?
Woman: Yes
Interviewer: Why are you not drawing water from the pump[22]?
Woman: I have no money. If I go to the pump will I be allowed to draw free of charge?
Interviewer: Is that why you draw from this well?
Woman: Yes. It is serious when one does not have money, and particularly when the pump is not functional. Even today, it is still not functional. They say a pipeline is broken.
Interviewer: When the water in the well finishes, what do you do?
Woman: The water never finishes. It is there all year round.
Interviewer: Who owns the well?
Woman: Do I know? I am only drawing water. I am a stranger. Are you looking for the owner of the well?
Interviewer: No. Are people restricted from drawing water from the well?
Woman. No, anyone can draw water from here.
Interviewer: What do you use the water for?
Woman: I use it for washing and bathing, I dare not drink it. I use the pump water for drinking.
Interviewer: But you said you do not have money to pay for water at the pump. Do you pay for the water you draw from the pump?
Woman: Yes. I draw water from here for my daughter-in-law to bath the children and also for washing, whilst my daughter-in-law draws from the pump for us to drink. We use the water jointly as a household, since I do not live alone.

Interviewer: So you live with other people in the house?
Woman: Yes, I live with many people in the house. I do not even know the number of people in the house. Does one person stay in a house?
Woman: do you want to repair the pump for us?
Interviewer: They are already working on the pump. I am assessing the management of the pump.
Woman: Yes, do work on the pump. Some people even had to draw water from the river because the pump has not been functional (excerpts from dialogue, 27th February 2014).

Source: Field work, 2014.

Although this was an informal discussion, the woman slightly confirms the view of the WSMT that the aged and the indigent are staying with relatives. However, the discussion with her further revealed that she would be required to pay if she goes to draw water from the stand-post. The water from the hand-dug well is free of charge. As such, it is used to complement water from the stand-posts as part of reducing water expenditure. This particular hand-dug well is opened to the public, as indicated by the woman. However, indoor hand-dug wells are restricted to the household usage and neighbours who negotiate to access water from them. It implies that the presence of

[22] Pump refers to the water system.

hand-dug wells, especially the unregulated ones, can reduce demand for water from the stand-posts (see details in section 6.5.4 below), thus affecting the financial performance of the water systems.

The characteristics of the respondents present a comprehensive cross-section of the various communities. As a result, the assessment of water systems' performance gives a fair representation of the communities. The subsequent sections present the key performance components of the water systems. For emphasis, the components are: (i) financial and technical efficiency; (ii) customer satisfaction with water services, including quality, reliability, pressure, and management activities; and (iii) governance, including accountability and participatory decision-making.

6.3 Financial and technical efficiency of the water systems

Much of the financial data focuses on Busa and Babile. This is due to non-availability of reliable and consistent financial data series in Gwollu and Daffiama. Several reasons account for the absence of data. Gwollu and Daffiama have a long history (since the 1960s) of small town water supply. However, none of them has an office accommodation for the staff. The staff operate from their respective homes (home-based water management). All official documents are kept in individual homes and this made it difficult to retrieve them because they are mixed with personal documents. Besides, attrition of some operating staff, without proper handing over, has contributed to poor documentation. For example, between 2007 and 2013, there were four different revenue collectors in Daffiama. The frequent changes amidst non-compliance with the boundary rules (exit and entry procedures) affected record keeping.

The revenue and expenditure patterns of Busa and Babile were computed using the monthly water revenue and expenditure sheets. The operating expense ratio (OER[23]) is used to measure the financial efficiency of a set up (Kohl and Wilson, 1997) and it is used in the financial performance of the water systems in this study. Table 6.8 shows the OER of Busa and Babile.

[2323] The Operating Expense Ratio is calculated by dividing the WSMT annual total expenditure by the gross revenue, and the result is expressed in percentage.

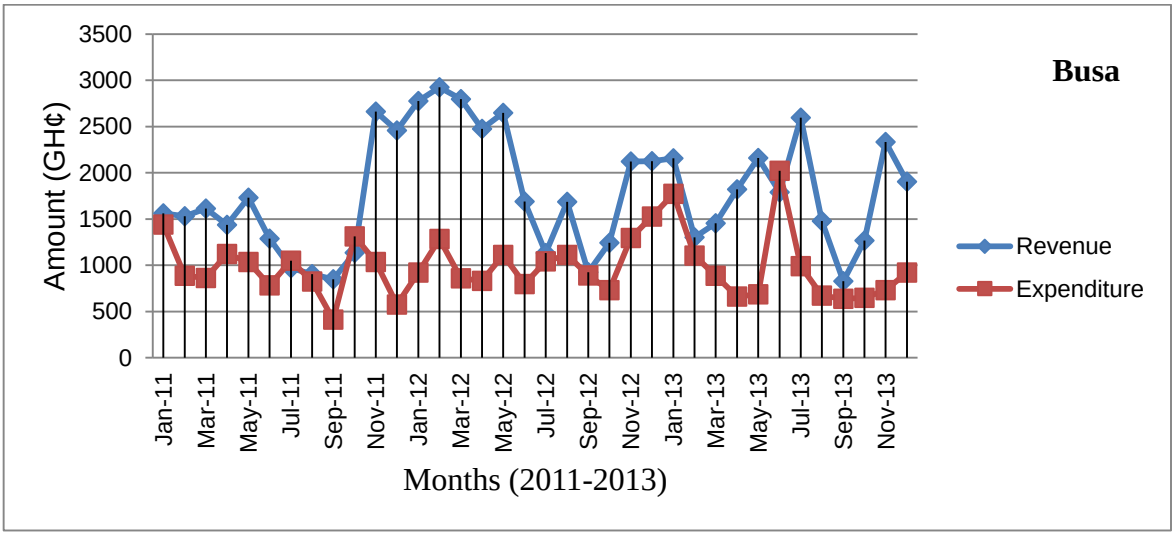
Table 6.8 Financial performance of Babile and Busa

Year	Babile			Busa		
	Revenue (Gh¢)	Expenditure (Gh¢)	OER[24]	Revenue (Gh¢)	Expenditure (Gh¢)	OER
2011	4,984.36	7,479.50	**150%**	18,142.13	11,344.30	**62.5%**
2012	11,490.75	10,303.23	**89.7%**	24,552.20	12,410.00	**50.5%**
2013	16,499.30	13,352.29	**80.9%**	21,093.23	11,734.38	**55.6%**
Average	32,974.41	31,135.02	**94.4%**	63,787.56	35,488.59	**55.6%**

Source: Calculated from the monthly revenue and expenditure (2011-2013)

On average, Babile has a 94.4% operating expense ratio since 2011. This does not represent efficient revenue generation and expenditure management. The high OER in 2011 is due to arrears of electricity bills from the preceding year. The trend in OER shows that there has been an improvement after 2011. The detailed monthly revenue and expenditure patterns are shown in the Figures 6.1 and 6.2. The detailed statistics are presented in Appendix C. On average, Busa has an efficient financial performance (see Table 6.8 above) due to stringent measures put in place by the water managers (see section 6.3.2 below for detailed analysis) to manage revenue loss.

Figure 6.1 Busa revenue and expenditure pattern



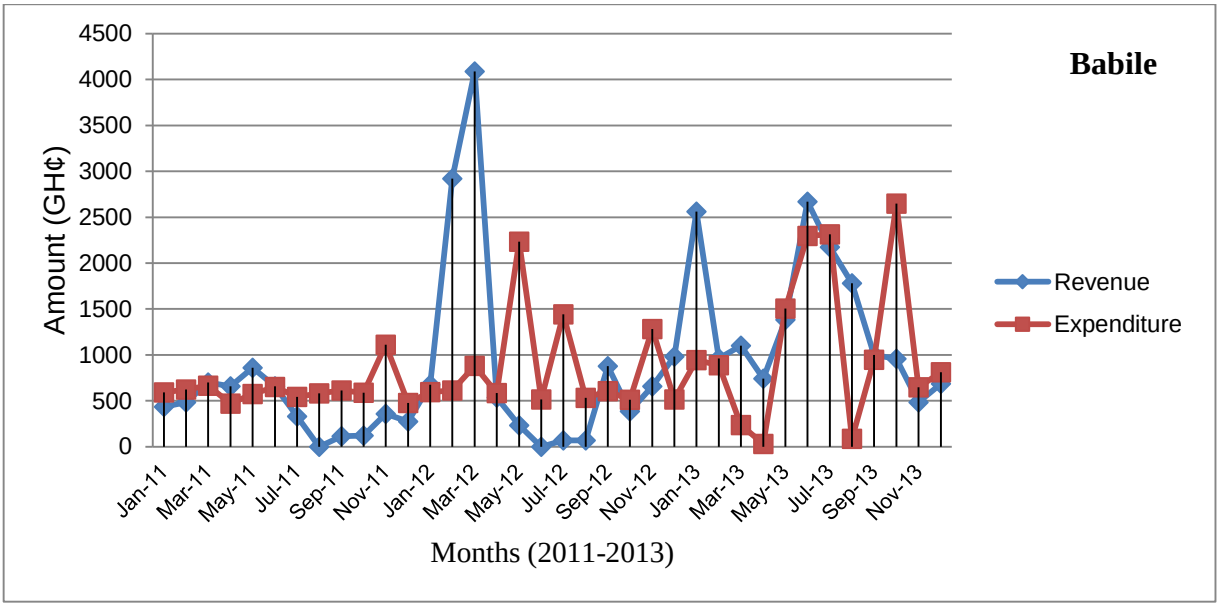
Source: Constructed from monthly revenue and expenditure (2011-2013)

In many of the months, the revenue is above the expenditure in Busa (see Figure 6.1). The revenue decreased between July and October 2011, due to the rainy season. Many households are farmers and during rainy season they spend a greater part of their time on the farms,

[24] The Operating Expense Ratio is calculated by dividing the WSMT annual total expenditure by the gross revenue. An average performance would have between 65% and 80%. An inefficient operation would have over 80% and an efficient operation would have less than 65%.

decreasing water usage at home. Secondly, households are able to harvest rain water for laundry and bathing and depend on piped water for drinking and cooking. Households with hand-dug wells are able to collect water, especially in the rainy season. In Figure 6.1, the revenue increased sharply from November 2011 to June 2011. This was the dry season where there was absolute demand for piped water. Busa generally had a stable expenditure pattern, except in January 2013 and June 2013. In January 2013 there was a major maintenance service while in June 2013, the WSMT had to settle electricity bills which were in arrears (see Appendix C for details).

Figure 6.2 Babile revenue and expenditure pattern



Source: Constructed from monthly revenue and expenditure (2011-2013)

In Babile, the main source of revenue in 2011 was sales from stand-posts. Between July and October 2011 the presence of alternative water sources (hand-dug wells and rain harvesting) reduced the demand for water from the stand-posts. As shown in Figure 6.2, the expenditure increased in November 2011 as a result of accumulated electricity bills which were paid in this month. According to the management staff, in February and March 2012, the WSMT opened applications for subscription to private homes with an initial application fee of GH¢75.00. There was an influx of applicants and this increased the revenue sharply (see Figure 6.2). However, due to weak responsiveness from the administration (operating staff), they could not issue water bills a month after the household connections. As a result, households had no indication of their bills and did not take any measures to conserve water usage. According to the WSMTs and the operating staff, when households were finally issued with accumulated bills there was a general protest over the bills, although they genuinely had consumed the specified amount of water they were billed on. The traditional authority and the WSMT decided that fresh bills should take effect from September 2012. This implies that, there was unbilled authorised consumption of water and

this constitutes revenue loss (see June 2012 to August 2012 in Figure 6.2 above). WSMT could not pay electricity bills due to low revenue but were compelled to pay in July 2012 to avoid disconnection from the electricity company. Appendix C shows the detailed variations in revenue and expenditure pattern.

In terms of expenditure, the main reasons for the undulating pattern include irregular payment of expenses such as Social Security and National Insurance Trust (SSNIT) contribution (Babile), electricity bills, and salaries of the operating staff. Although the water revenue is saved in banks, staff salaries are not paid directly through the banks but paid through what is popularly called "table-top payment". As such, salaries are often delayed into subsequent months. Payments of arrears have occasionally inflated the expenditure in subsequent months. Given the undulating nature of cash inflows and outflows, it is necessary to examine the main operating cost components of the water systems.

6.3.1 Main components of running cost and revenue collection ratio

The main components of the running cost of the water systems are electricity bills and personnel costs. Throughout the three years, personnel costs alone cover over 50% of the expenditure (see Table 6.9 for variations). The WSMTs (during the FGD) mentioned cost of electricity and spare parts as the key components of expenditure, and consequently, serve as the main determinants of the tariff levels. However, the financial data showed that the cost of spare parts (captured under all other expenses) constitute a small proportion of the expenditure.

Table 6.9 Component of operating cost of the water systems

Year	Expenditure component	Busa		Babile	
		% of Expenditure	% of Revenue	% of Expenditure	% of Revenue
2011	Personnel[25] cost	51.46%	32.3%	75.34%	113%
	Electricity Bills	43.16%	27%	22.84%	34.3%
	All other expenses	5.38%	3.4%	1.82%	2.7%
	Total	100%	62.7%	100%	150%
2012	Personnel cost	72.43%	36.6%	88.39%	79.3%
	Electricity Bills	19.10%	9.7%	7.56%	6.8%
	All other expenses	8.47%	4.3%	4.05%	3.6%
	Total	100%	50.6%	100%	89.7%
2013	Personnel cost	68.52%	38.1%	56. 75%	45.9%
	Electricity Bills	18.87%	10.5%	16.18%	13.1%
	All other expenses	12.61%	7%	27.07%	21.9%
	Total	100%	55.6%	100%	80.9%

Source: Monthly revenue and expenditure of WSMTs (2011-2013).

[25] Personnel costs include salary of operating staff, sitting allowance for WSMT members and commission for vendors.

In 2013, Busa and Babile had major repair works on the water systems and that increased the proportion on all other expenses to 12.61% and 27.07% respectively. The details are shown in Appendix C. Babile has the highest number (eight personnel) of operating staff with an average salary of GH¢70/month. This has increased the manpower cost of running the water system. Busa has four operating staff with an average salary of GH¢100/month (see Appendix C for the detailed salary structure). In terms of expenses as a share of revenue, personnel costs continue to dominate (see Table 6.9). The proportion in Busa increased over the period while Babile had a reduction. The reduction in Babile is not due to a decline in the quantum of staff salary but due to a step-up in revenue mobilisation, as shown in Appendix C.

The revenue collection ratio (RCR) is the ratio of the amount billed (expected revenue) for water to the actual revenue collected. In 2011, Busa had a revenue collection ratio of 85.56%. That is, 85.56% of the total expected revenue was actually received. The ratio subsequently decreased to 69.09% in 2012 and 63.33% in 2013. The main reason for the relatively poor performance in recovery is water loss at the stand-posts. The expected revenue is based on a meter reading which presumes that the water is consumed. In Babile, between September 2012 and December 2013, the total bill submitted to private subscribers was GH¢21,371.50 and the total received as payment of bills was GH¢15,169.50, giving a revenue collection ratio of 70.98%. Data available shows that in Babile, between 2011 and 2013 the expected revenue from stand-posts based on the consumption was GH¢7,087.82 and the amount collected within the same period was GH¢6,257.90. This gives a collection ratio of 88.3%. This implies that collection efficiency is better for stand-posts in relation to the private collections. The situation was not so different in Daffiama. Data available in 2013 showed that the total amount billed for the year was GH¢15,888.50 and the amount collected was GH¢11,235.90. This gives a revenue collection ratio of 70.72%. The situation is worse in Gwollu. According the WSMT and the operating staff, for the past two years, the revenue collection ratio has been less than 50%. They attributed it to two main factors: poor collection mechanisms (see sections 7.5.2 and 7.5.4) and non-willingness of the government departments and their staff to pay water bills. Although the details are not available, the list of defaulters (see Appendix F) supports their argument.

6.3.2 Water and revenue loss

Water loss and revenue loss are treated concurrently because they have a direct link. In all the communities, water vending is the main source of revenue. From the household survey, 49.3% indicated that there is water loss in the communities and 23.4% indicated that there is no water loss in the community. 27.3% of the respondents could not tell whether there is water loss or not. The discussions with management staff and the household survey reveal that pipe leakages and

poor tracking of water distribution have been the major sources of water loss. For example, although there are bulk-meters on the high level tanks (HLTs) there are no records on the quantity of water that passes through them periodically. As a result, the operating staff are unable to determine the stage at which water is lost. That is, they are unable to indicate the quantum of water loss prior to distribution and then during distribution. Thus, knowledge of water loss is limited to causes such as: expansion of neem trees roots over pipes, which cause the pipes to burst; erosion which exposes the pipe to hazards (see pictures in Figure 6.3 below); construction activities over pipes; general pipe burst or faulty joints; and periodic washing of the HLTs. For example, in Busa, the data on the volume of water produced and the amount of water consumed (using meter readings) show that, in 2011, 18900m^3 was produced and 11,648.11 m^3 was consumed. This gives water loss of 38.4%. The percentage of water loss decreased to 15.3% in 2012 and increased to 31.8% in 2013 due to the above factors. With a tariff of GH¢2.00/m^3 at the time of the study, the volume of water loss had an equivalent of GH¢14,504.00 of revenue loss, which represent 79.9% of the 2011 revenue.

Given the causes of water loss, timely reporting and attendance to reported cases are necessary in fighting water loss. Households' opinion were sought on the factors that militate against fighting water loss in their respective communities. According to the household survey, 28% indicated that limited information or non-reporting is not a challenge in fighting water loss while 26% mentioned it as a challenge. The remaining 46% of the respondents do not know whether limited information is a challenge or not. The study established opposing views on reporting and response to leakages. The management staff claimed that customers are reluctant to pay for repairs or even report the case to the operating staff. This is common in situations where customers realise that the fault/leakage does not affect the meter readings and they can still access water. On the other hand, customers complained that they do not get timely repair services, especially when the fault is located immediately after the water meter. In such cases, they will be paying for (lost) water. From the survey, 60.3% of those who reported repair works to the operating staff indicated that they did not receive timely maintenance. According to these people, the response to request for repairs takes an average of three weeks, and at the time of the research, it was observed that some requests had not been honoured.

Figure 6.3 Causes of water loss

Source: Field observation, 2014.

Despite the arguments on reporting cases of leakages with indoor taps, the management also indicated that community members are good at reporting general pipeline bursts. This supports the household survey results that reporting leakage to management staff is not a constraint to fighting water loss. Instead, 43.3% of respondents attributed the challenge in overcoming water loss to capacity weakness and lack of commitment of management staff to a timely response to reported cases. Another 47.3% of the respondents attributed the challenge in fighting water loss to poor maintenance and lack of routine checks on the main components of the water systems. This is supported by lack of records (status reports) on the water systems.

During a key informant interview on water loss, it was revealed that in the night, some community members fetch water through a leakage close to the HLT (see picture in Figure 6.3). With this, I visited the site with a community member around 8.30pm and saw people drawing water through the leakage. Interestingly, after the last person drew water, she used a container to cover and

bury the leak with sand to avoid excessive gushing of water in the day time, which would be conspicuous to passers-by. Certainly, such individuals are reluctant to report the leakage to management staff because they benefit from it. Besides water loss, the use of sand to cover a pipe burst can result in water contamination. Nonetheless, effective monitoring and commitment by water managers would have rectified the situation, given the location of the leakage; about 20 meters from the HLT and 35 meters from the main road.

The research established that all the communities performed multiple but uncoordinated land use functions, namely: residential, compound/backyard farming, marketing and transportation. The distribution and the transmission lines (sometimes poorly laid) meander within these functions. According to the operating staff in all the communities, pipeline leakages in the rainy season are difficult to detect due to grass and crop cover. Thus, the time from leakage occurrence to detection can take several days. Moreover, depending on the availability of spare parts, there can be delays from detection to repair. Due to poor coordination between water infrastructure design and road design, some transmission lines were laid on road reservations and this was found in Babile and Gwollu. Hence, there were reported cases of damaged pipelines during road construction. Figure 6.3 above shows a collapsed bridge, which affected a transmission line.

Another source of water loss is through stand-posts which are close to mosques. The vendors complained of people who come with kettle (about 2 litres) to fetch water (a quantity that is difficult to be priced), to perform ablution. Similarly, vendors who are close to lorry stations complained that passers-by demand water in small quantities from the stand-posts to either drink or for other purposes. The practice of these people contributes to apparent water loss, although the custom of the area requires that passers-by should not be deprived of water. Vendors are torn between honouring a custom that strangers should not be deprived of a calabash of water, and minimising water loss. Management staff has not been able to resolve this issue, rather maintaining that it is at the discretion of the vendors to either give or deny the passers-by.

An additional source of revenue loss is the use of flat rates for subscribers with faulty water meters. As at the time of the research, 6 customers, representing 4.3% of the private connections were on flat rates in Daffiama. In Babile, 3 customers representing 3.3% of the private connections, were on flat rates while in Gwollu, 7 customers, 4.8% of the private connections, were on flat rates. The WSMTs and the operating staff in Daffiama and Babile use household size, previous water bills and the type of water usage as the determinants of the flat rate. Gwollu has a uniform flat rate (GH¢5.00) for domestic subscribers. A review of a household's water bills revealed that due to the meter breakdown, the household was billed on a flat rate (GH¢10.00/month) for 11 months. After

the meter was restored, the first bill was GH¢76.50//month. Certainly, the usage of water during the flat rate could be higher, since customers will not want to pay high for less water consumed, indicating that the WSMT would have lost revenue as a result of the flat rate. Similarly, another customer whose previous average monthly bill was GH¢47.00 was billed on a flat rate of GH¢20.00 after the meter became faulty. In both scenarios the WSMT incurred apparent water loss. Therefore, the use of previous meter reading, water usage type and household size to determine flat rate does not guarantee efficient revenue generation from faulty meters.

Additionally, non-payment of water bills is a source of revenue loss. Available data on payment of water bills show that households are progressively living up to their obligations in paying water bills. However, state agencies and their employees are the key defaulters. For example, the audit report of Gwollu WSMT revealed that as at the end of 2013, an amount of GH¢8,332.90 was in arrears for the provision of water services to various individuals (mostly public sector employees) and government departments, including the District Assembly and the Ghana Police Service as the highest defaulters (see Appendix F). Although the audit report attributes it to a lack of seriousness on management staff to submit bills and ensure that they are paid, there is a free-riding attitude of the defaulters, especially the government departments. These departments, and the individual employees, are abreast of the requirements of CBWM. They are well-informed that non-payment of bills makes it difficult for management to maintain the desired level of services or expand services.

An interview with the District Commander of the Ghana Police Service revealed that there are bureaucratic procedures in the payment of utilities bills, which results in delay of payments to the utility service providers. Accordingly, the bills are compiled and sent to the national level through the regional headquarters. After following the necessary procedures at the national and regional levels, cheques are issued to the district levels to effect payment. Despite the procedures, it can be argued that a three-year debt (see Appendix F) to a community-based water service provider borders on non-commitment to pay bills (free-riding), which stifles water management activities. Therefore, the calibre of individuals and organisations that are defaulters support the argument of WSMT members that *unwillingness* to pay and not *ability* to pay is the main issue in water services delivered to government departments and some prominent individuals.

Disconnection of defaulters is a strategy of minimising revenue loss through non-payment. In all communities, there were attempts to use this strategy but there are no structured procedures guiding its execution. At the time of the research, Busa had disconnected two customers for non-payment and they have since not been reconnected. In Babile, consumers who default payment

for three months are due for disconnection, and it is often executed. That is, disconnection is based on the duration of non-payment rather than non-payment of a certain percentage of the bill. This is not entirely a good approach because a customer who pays a small fraction of the bill for an unspecified period is not disconnected while another customer whose bill is small but fails to pay for three months is disconnected. However, the management staff tagged the duration to unwillingness rather than ability to pay. Disconnection of defaulters has not been a successful adaptation strategy in Gwollu, partly due to power differences between the defaulters and the management staff. The management staff are able to disconnect households for non-payment of water bills but unable to disconnect government departments and staff. Hence, while the WSMT is aware of the rules on connection and disconnection of services to customers, it has no will-power to execute it due to the status of defaulters. The option available to management staff is an appeal for payment of arrears by issuing a reminder to the defaulters (see Appendix G).

As at the time of the research one out of the eleven stand-posts was functioning (the Researcher observed vending to the public taking place) in Daffiama while in Babile, six out of the eleven stand-posts were functioning (vending to the public was taking place). All the stand-posts in Gwollu and Busa were functioning. In Daffiama, the WSMT and the operating staff posited that stand-posts vending is the leading source of revenue loss. Many vendors are in debt and the WSMT decided to suspend vending and rather encourage private subscription. Unfortunately, the debt from the stand-posts became a bad one. In some cases, the vendors were still in possession of the keys to the stand-posts but refused to sell water in order to avoid continuous increase in debt. A good management approach is to lock up the stand-posts and retrieve all keys from the vendors. However, this was not done.

It was established that some individuals, especially those who stay close to the stand-posts and have activities (such as food vending) that require large quantity of water, have negotiated with some individual members of the management staff to use the public stand-posts for their private use. Hence, in some sections of Daffiama and Babile, the stand-posts have been given to individuals for private use[26], and they are billed as a private connection. That is, such stand-posts are not accessible to the general public, unless the person who acquired to stand-post from the WSMT/operating staff decides to sell water to the public. Rather than viewing this strategy as a denial of some individuals to public water services, the staff highlighted the gains from the strategy. Accordingly, the WSMTs are not required to pay a vendor's commission and, as such, retrieve 100% revenue from water consumed.

[26] For instance, in Daffiama, a stand-post was closed down due to high debt. A woman who stays close to the stand-post negotiated with management staff to allow her to use the stand-post to facilitate her food vending. This was agreed and the keys to the stand-post given to her. At the time of this study, she was using the stand-post in a similar manner as the private subscribers.

Busa has a different strategy to fighting revenue loss, which comes through public vending at the stand-posts. The WSMT and the operating staff decided that, where the amount of revenue expected is much higher than the amount collected, the vendor receives half of the computed commission while the remaining half is paid into the coffers of the WSMT. The deductions were noticed during the computation of water revenue and losses. This was confirmed by the vendors during the FGD. This strategy has made vendors so vigilant and hardly allow small girls to sell water, as it is being done in the other communities. Additionally, replacement of vendors in Busa follows laid down rules and this has ensured that exiting vendors cleared all debts before handing over the stand-posts. An informal discussion with a resigned vendor confirmed that she defrayed all debts before her resignation was accepted.

6.3.3 Tariff structure and households' perspectives

Tariff setting in small towns is to be regulated by their respective District Assemblies without recourse to other districts. The interviews with the Community Water and Sanitation Agency (CWSA) and the District Water and Sanitation Teams (DWSTs) revealed that the essence of the District Assembly regulation is to serve two purposes: (i) to guarantee that customers are not exploited or coerced into accepting the proposed rate; and (ii) to ensure that the tariff is able to, at least, breakeven the cost of operation and the water revenue. Therefore, the structure of tariff setting is to assure customers of value for money, and also prepare the water system, financially, to adapt to any abrupt stress. This arrangement presupposes that the information rules are working and, as such, the District Assemblies are in close contact with the WSMTs and are abreast of their financial status.

The regulatory arrangement for tariff setting also implies that the presence of numerous districts creates multiple regulators. For example, there are eleven autonomous District Assemblies in the Region. Practically, this suggests that there are eleven different rates in the Region. Although there are multiple regulators within one region, the regulators seldom carry out their role and this was established during the research. Tariff setting is left to the discretion of the WSMTs and this has further widened the differences in tariffs levels as shown in Table 6.10.

Table 6.10 Existing water tariff structure (GH¢/m3)

Connection/usage type	Babile	Busa	Gwollu	Daffiama
Domestic	2.00	2.20	0.7	1.50
Commercial	2.50	-	1.30	1.50
Institutional	2.50	-	0.8	1.50
Stand-post	2.00	2.20	0.7	1.50

Source: Field work, 2014

Additionally, the fundamental objective of the water system under the NCWSP strategy is to provide potable water for domestic purposes. However, the insurgence of multiple use water services does not limit the consumers' range of water uses. Different water uses come with a different quantity of water consumed. As a result, management staff charged different rates for the different uses, as shown in Table 6.10. This is similar to the urban water tariff structure, although the two settings are independent of each other. Records from the Ghana Urban Water Company shows that urban tariff is lower than small town tariff. For example, within the first quarter of 2014, the tariff for urban domestic water consumption was GH¢1.34/m^3 for the first 20m^3 of water consumed and 2.02/m^3 for consumption above 20m^3. Within the same period, water was sold at GH¢1.50/m^3 in Daffiama, GH¢2.00/m^3 in Babile, GH¢2.20/m^3 in Busa, and GH¢0.70/m^3 in Gwollu. Apart from Gwollu, where the tariff was lower (see Table 6.10), the other three communities had tariffs above the urban settings. Daffiama uses a uniform rate irrespective of the consumption type. This practice does not promote conservation of water and the commercial customers tend to gain.

According to the management staff and the DWSTs, the different rates in Table 6.10 are based on equitable principles. That is, those who use water for commercial purposes should pay higher because they are making a profit and they also consume a large quantity of water. However, dishonesty remains a challenge: from the household survey, it was observed that some households subscribe for domestic purposes and later use the water for commercial purposes while they are still billed on the domestic rate. For instance, some households subscribed for domestic purposes, but use the water for food vending and pito brewing. From Table 6.10, there are varied tariffs across communities for the same water use type because the WSMTs are independent, and practically tariff setting is unregulated.

If the argument on equity principles, which has been put forward by the management staff and the DWSTs, is anything to go by then there should be lifeline rates to promote equity and to serve as an incentive for water usage conservation. Unfortunately, in all the communities there are no lifeline rates despite the presence of multiple uses of water. The absence of a lifeline rate does not serve as an incentive to conserve water because the same rate is applied irrespective of the quantity of water consumed. However, urban water systems in Ghana have a lifeline rate, which seeks to minimise excessive water usage and to cushion the poor against an increase in rates. A lifeline rate is significant in small towns because the majority of the customers use water for domestic purposes and, as such, those who use water in large quantities (government departments and staff, and commercial users) can subsidise the cost for domestic customers.

In all the communities, management staff justified their tariff structure by comparing the cost of a basin of water to the cost of a sachet of water, popularly called “pure water”. A sachet of water (about 0.5 litres) (see Figure 6. 4) costs GHp10.00 and it is patronised in the communities. A basin of water (about 20 litres) was set at the same amount (GHp10.00) in Babile and Busa. The cost of a basin in Daffiama was GHp20.00. In Gwollu, a plastic basin (a common container used in the community) is small in relation to the silver basin in the other communities and, as such, three plastic basins of water cost GHp10.00 (GHp10.00/3 basins). In setting their pricing from the baseline of sachet water prices, the management staff failed to acknowledge that: (i) the model of operation (private sector with profit orientation) is different for a sachet water company; (ii) tax is paid by the sachet water producing companies, which is not applicable in CBWM; and (iii) the costs of refrigeration of the sachet water that those companies incur.

Figure 6.4 A sachet of water and a basin of water

Source: Field work, 2014

The variation in tariff is not limited to between communities but also exists *within* communities. In a section of Babile, the women indicated that at the beginning of the water system they paid Ghp5.00/basin and management staff later increased the rate to Ghp10.00/basin and there was still demand for the water because *“we cannot compare water to anything on earth”* (Excerpts from group discussion, 12th December 2013). They however regretted that even with the Ghp10.00/basin, the vendor was not always at the stand-post. At the time of the research, water was sold at Ghp20.00/basin in that section, while the rate in all other sections in Babile was still Ghp10.00/basin. With informal sharing of water information among the women, they noticed the tariffs differences. The women refused to buy water from the stand-post because they felt cheated, and resorted to fetching from hand-dug wells. They maintained that with a general upward review of water tariff in Babile, they would also adjust their expenses to accommodate the increment.

However, they would not pay the higher price while others are paying less within the same community. These women are arguing for justice in water pricing within the community.

When the issue of suspected tariff difference within the community was raised during a focus group discussion (FGD) with the WSMT and the operating staff, they argued that there are plans to increase the cost of a basin, but it has not yet taken effect. Whereas management staff insisted that a basin is sold at GHp10.00/basin, the joint discussion with the vendor and the customers showed that water was sold at Ghp20.00/basin. Based on the discussion with management staff, customers (women) and the vendor on this scenario, it was evident that there was a vending conspiracy between the vendor and some operating staff to exploit the customers for personal gain.

Similarly, some vendors in Gwollu sell at GHp5.00/basin while others sell at Ghp10.00/3 basins. Both groups were instructed by the WSMT to sell at these prices. Remarkably, the focus group was the first time that some vendors got to know one another because apart from Busa and Babile where operating staff and the WSMTs had meetings with the vendors, there were no such meetings in Gwollu and Daffiama. They were surprised at the different rates and fringe benefits granted by the WSMT to their colleagues. The internal variations in water tariffs, especially for the stand-posts, create a suspicious favouritism within management, which has the potential of breaking social cohesion in water management. The differences in tariffs across communities make it necessary to assess the views of households on the level of tariff. Table 6.11 shows the respondents' views on the existing tariffs.

Table 6.11 Households' views on water tariff

View	Babile	Busa	Gwollu	Daffiama	Average
High	32.4%	21.7%	30.0%	60.0%	37.3%
Normal	67.6%	78.3%	62.0%	40.0%	60.0%
Low	0.0%	0.0%	8.0%	0.0%	2.7%
Response	**Does the tariff limit the quantity of water used?**				
Yes	35.1%	30.4%	20.0%	50.0%	33.3%
No	64.9%	69.6%	80.0%	50.0%	66.7%

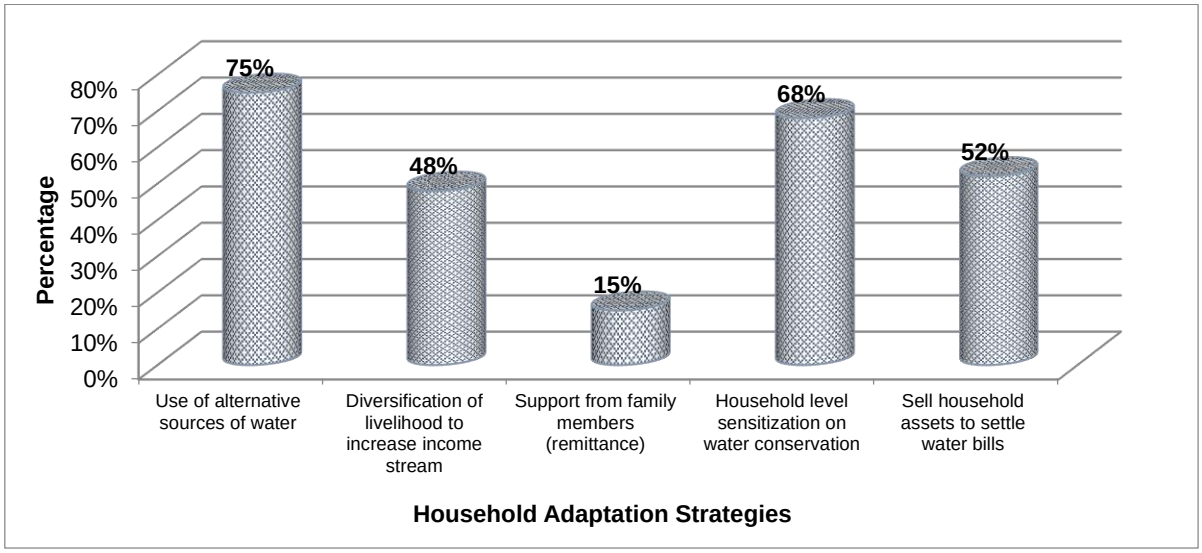
Source: Field work, 2014.

On average, 60% of the respondents indicated that the water tariff is normal and they can afford to pay. Interestingly, it was only in Gwollu that respondents (8%) mentioned that the tariffs are low, which supports the comparison in Table 6.10. A cross tabulation of household views on tariff and gender showed that all those who indicated that the tariff was too low were males and they equally had tertiary education. For instance, a public servant (household respondent), who had previously

worked with the water sector, in southern Ghana, indicated that the tariffs are low and questioned how they are able to supply water using the existing tariff. Although Busa has the highest domestic tariff, 78.3% of the households said the tariff was normal. As indicated in Table 6.11, an average of 66.7% of respondents indicated that the tariff does not limit their water usage, with a higher proportion (80%) in Gwollu. This is partly due to the relatively low tariff in Gwollu. It is worth noting that households are able to relate tariff adjustment to general inflation. They indicated that inflation has affected the cost of water production, and it is necessary to increase the tariff to ensure continuous supply of water. For such people, the existing tariff was reasonably priced.

Adaptation strategies: Despite the different views on the tariff structure, the households have developed adaptation strategies to maintain their access to water. Figure 6.5 shows the adaptation strategies of households.

Figure 6.5 Households' adaptation strategies to water pricing



Source: Field work, 2014

The main adaptation strategy (see Figure 6.5) is the use of alternative sources of water. Some households, especially in Daffiama, pay monthly for the borehole with a hand pump to enable them access anytime they are unable to raise money for the daily pay-as-you fetch. Those with indoor taps also use boreholes and hand-dug wells in order to reduce water expenses. This is common in Babile and Daffiama. Other adaptation strategies include diversification of livelihood sources, sale of household assets and reliance on remittance. Many households are farmers and farming is their main source of livelihood. In explaining the need for diversification of livelihood, a woman in Busa explained in the following statement:

"Now we do not have free water, and as such, we have to find other sources of income to be able to pay for modern water[27]. In addition to farming, some of us gather stones, firewood, produce charcoal to sell, and others engage in petty trading. We cannot rely on farming again because we are growing old and weaker. It also rains at the time that we do not expect rains, and stops at the time that we expect it. Can we rely on farming under such conditions?" (Excerpts from HHS, 9th January 2014).

This implies that farming cannot be totally relied on as a source of livelihood due to the changing rain pattern which necessitates the use of other income generating ventures. In order to minimise expenses on water, individuals with private connections advise household members against water wastage. Such people are convinced that judicious use of water by households will reduce the cost of operation and maintenance, and that will reduce the tariff. Remittance is rather relatively a less common adaptation strategy, and the main beneficiaries are the aged. For some of them, the subscription fees and cost of materials were equally paid through remittance.

6.4 Water services, customer satisfaction and management activities nexus

In this study, customer satisfaction with water services was analysed using three core service indicators: (i) water quality[28]; (ii) pressure of water flow[29]; and reliability of water supply[30]; within the past one month. These indicators were arrived at based on the pre-test of the household questionnaire. The choice of one month was to give respondents a good sense of memory and to ensure reliability of data. It was also informed by the pre-test of the research tools. However, respondents were at liberty to present a historical experience with any of the variables. Table 6.12 shows households' assessment of water services.

[27] The woman was referring to the piped water

[28]Excellent Quality: Clear, no visible particles, tasteless & no smell
Good Quality: Presence of one of the above elements
Poor Quality: Presence of all above elements

[29]Excellent Pressure: High pressure throughout
Good Pressure: Intermittent pressure
Poor Pressure: Low pressure at all times

[30]Excellent Reliability: Continuous supply for 24hr/week for a month
Good Reliability: Intermittent supply but more than 4days/week
Poor Reliability: Highly intermittent supply, less than 4days/week

Table 6.12 Households' perception of water service indicators

Small Town	Water attributes	Excellent	Good	Poor
Babile	Quality	81.1%	18.9%	0.0%
	Pressure	54.1%	37.8%	8.1%
	Reliability	35.1%	56.8%	8.1%
Busa	Quality	78.3%	21.7%	0.0%
	Pressure	21.7%	69.6%	8.7%
	Reliability	26.1%	65.2%	8.7%
Gwollu	Quality	90.0%	4.0%	0.0%
	Pressure	36.0%	58.0%	6.0%
	Reliability	14.0%	56.0%	30.0%
Daffiama	Quality	62.5%	35.0%	2.5%
	Pressure	47.5%	47.5%	5.0%
	Reliability	25.0%	67.5%	7.5%
Average	Quality	**80.7%**	**18.6%**	**0.7%**
	Pressure	**41.3%**	**52.0%**	**6.7%**
	Reliability	**24.0%**	**60.7%**	**15.3%**

Source: Field work, 2014.

Quality: Laboratory test of water is done at two main stages. The first testing is done immediately after construction (drilling of borehole) and second test is done after mechanisation and complete installation of the water system. Subsequently, annual quality test is expected to be carried out and results made available to the WSMTs. In Gwollu and Daffiama, water quality test was carried out in 2007, immediately after construction. The management staff however do not have the results of the quality status of the water but indicated that treatment is done periodically using chemicals such as chlorine. In Busa, sample of the water was taken for water quality test in 2012 and accordingly there was no feedback on the quality status. They assumed that the quality meets the World Health Organisation standards and that explains the absence of feedback. This however raises questions on the information flow between the community level structures and the external actors. In 2013, water quality test was carried in Babile and the results (made available to the Researcher) show that the quality of water falls within the WHO standards. Although the operating staff in all the communities indicated that they quarterly treat the water with chemicals, there were no records to substantiate their claims.

In terms of customers' rating of water quality, on average, 80% of the respondents rated water quality as excellent. The score is higher in Gwollu (90%) and lower in Daffiama (62%), as shown in Table 6.12. These are based on households' perception because their assessment was not based on any scientific or laboratory test of quality. During the discussion on the quality of water in Daffiama, it was revealed that bees invaded the HLT and created wax. According to the operating staff, they had no knowledge of it until customers complained of strange particles, including bees, in the water. It presupposes that within the period, there was no washing or routine checks on the HLT, otherwise the invasion of the bees would have been detected by the operating

staff. At the time of the research, the particles were still evident in the water, based on physical observation. The presence of bee particles partially influenced the respondents' assessment of water quality, resulting in a significant difference in water quality between communities [F (3, 146) = 6.089, P = 0.001].

Pressure of flow: In all the communities, pressure of water flow had an average rating. As shown in Table 6.12, 52% of respondents rated pressure of flow as good while 41.3% rated it as excellent. The ANOVA results confirmed that there was no significant difference, F (3, 146) = 1.776, P = 0.154, in water pressure rating among the communities. Although there is an improved time saving in accessing water, an excellent pressure of flow could further reduce the time spent in accessing water.

Reliability: On average, 24% of the households rated reliability as excellent. There is significant difference in reliability rating, F (3, 146) = 4.378, P = 0.006, between communities. Gwollu performed below average in terms of reliability (see Table 6.12). Water supply reliability which is of great importance to the customers was rated low in relation to water quality and pressure of water flow. Based on the water service indicators above, the households expressed their general level of satisfaction with the services. Table 6.13 shows the level of satisfaction of the customers.

Table 6.13 Households' satisfaction with water services

Variables	Babile	Busa	Gwollu	Daffiama	Average
Very satisfied	27.0%	30.4%	4.0%	22.5%	18.7%
Satisfied	40.5%	52.2%	48.0%	35.0%	43.3%
Neutral	21.6%	0.0%	2.0%	22.5%	12.0%
Dissatisfied	10.8%	17.4%	36.0%	20.0%	22.7%
Very dissatisfied	0.0%	0.0%	10.0%	0.0%	3.3%

Source: Field work, 2014

Dissatisfaction levels are relatively high in Daffiama and Gwollu and this is a reflection of households' assessment of service indicators (pressure and reliability). The assessment may also be indirectly influenced by, for example, factors such as households' opinion of management staff's behaviour (see elaboration in section 6.4.1) within water services delivery. On the other hand, there is high level of satisfaction in Busa. Statistically, there is a significant difference F (3, 146) = 6.282, P = 0.000, among communities in terms of satisfaction with water services. Table 6.14 shows the details of across tabulation between the service indicators and the general service satisfaction level.

Table 6.14 Households' satisfaction and service level assessment

Service indicator	Scale	Very satisfied	Satisfied	Indifferent	Dissatisfied	Very dissatisfied
Reliability	Excellent	39.3%	23.1%	11.1%	23.5%	0.0%
	Good	57.1%	67.7%	88.9%	41.2%	20.0%
	Poor	3.6%	9.2%	0.0%	35.3%	80.0%
Pressure	Excellent	53.6%	43.1%	33.3%	35.3%	20.0%
	Good	46.4%	47.7%	66.7%	55.9%	60.0%
	Poor	0.0%	9.2%	0.0%	8.8%	20.0%
Quality	Excellent	75.0%	81.5%	83.3%	79.4%	100.0%
	Good	25.0%	16.9%	16.7%	20.6%	0.0%
	Poor	0.0%	1.5%	0.0%	0.0%	0.0%

Source: Field work, 2014.

When reliability, pressure and quality of water were mapped against indoor tap customers and stand-post customers from the SPSS database, the results revealed that in each service indicator, there is no difference in customers' assessment. This means that reliability depends on the main production points of water and not necessarily with individual indoor taps or stand-posts. Additionally, a cross tabulation of satisfaction level and service indicators showed that reliability of water supply is the driving determinant of customer satisfaction. As shown in Table 6.14, 80% of those who are very dissatisfied with water service also rated reliability as poor. As shown in Table 6.14, 100% of those who were very dissatisfied still rated quality as excellent, showing that the importance that households attach to water reliability is partially due to the multiple uses of water (construction, washing of cars, pito brewing and food vending). As far as these uses are concerned, there is less concern about water quality from a source such as the small town water system. That is, reliability is a quantifying requirement and quality is only secondary to that.

The activities of the management staff have a bearing on the level of water services. In that regard, the survey examined households' satisfaction with existing management activities. Table 6.15 shows the results on households' perception of how management staff execute their functions.

Table 6.15 Households' satisfaction with management activities

Satisfaction level	Babile	Busa	Gwollu	Daffiama	Average
Very satisfied	5.4%	26.1%	0.0%	7.5%	7.3%
Satisfied	59.5%	52.2%	26.0%	35.0%	40.7%
Indifferent	16.2%	13.0%	16.0%	25.0%	18.0%
Dissatisfied	13.5%	8.7%	48.0%	30.0%	28.7%
Very dissatisfied	5.4%	0.0%	10.0%	2.5%	5.3%

Source: Field work, 2014

Table 6.15 shows that 30% and 48% of respondents in Daffiama and Gwollu respectively were dissatisfied with management activities. Satisfaction is higher in Babile and Busa than the other

communities and this is confirmed by the ANOVA results, F (3, 146) = 11.953, P = 0.000, which show that there is significant difference in satisfaction between communities. This is partly due to quality differences and mismanagement of finances in some communities. The recent breakdown of Gwollu water system also influenced the assessment. The analysis established the relationship between satisfaction with management activities and satisfaction with water services using Pearson correlation. The results show a slightly strong positive relationship (r = 0.608): satisfaction with management activities is strongly influenced by satisfaction with water services. The coefficient of determination (r^2 = 0.37) shows that 37% of the households' assessment of management activities is influenced by their level of satisfaction with water services. The remaining 63% are related to unidentified factors.

6.4.1 Trust in water management

Based on the household assessment of management activities, it was necessary to examine the general trust that households have for management staff. Generally, the survey showed that 29.3% of respondents do not trust any of the management staff while 5.3% remain neutral. Table 6.16 shows the differences in household trust for management staff across the communities.

Table 6.16 Households' trust for management staff

Trust for staff	Babile	Busa	Gwollu	Daffiama	Average
Yes, all of them	40.5%	52.2%	6.0%	10.0%	22.7%
Yes, some of them	35.1%	30.4%	50.0%	47.5%	42.7%
None of them	16.2%	13.0%	42.0%	35.0%	29.3%
Neutral	8.1%	4.3%	2.0%	7.5%	5.3%

Source: Field work, 2014

There is higher trust for management staff in Babile and Busa than in Daffiama and Gwollu. This is confirmed by the ANOVA results, which show that households' trust for water management staff differed significantly across communities, F (3, 146) = 6.404, P = 0.000. From the households' explanations (qualitative response), about 82.6% of those who trust management, the trust is attached to water availability. According to these households, the management staff are living up to expectation since they are able to supply water to customers. Another 12% of the respondents trust management staff because they are natives and, as such, will not do anything that will adversely affect the water system. Based on the households' responses, three main reasons were given for lack of trust of management staff. From the multiple responses, 67.4% did not trust management due to lack of community involvement in decision-making, while 52% attributed lack of trust to deficiency in transparency and accountability. About 44% indicated that they suspect mismanagement of water revenue by management staff. These three reasons are interrelated but have been categorised in this manner in order to convey the true message of the household

respondents. For example, a household member had this message about trust for management staff:

> *"I do not trust the management staff at all. If they can issue fake receipts for bills paid in order to divert community money for private use, how do I trust such people as managers of a community resource?"(Excerpts from HHS, 12th March 2014).*

It was established that an operating staff who acted as a revenue collector was issuing fake receipts for water bills collected and diverting the money for personal use. As such, some households maintained that management staff conspired to defraud the community of the water revenue. It was also argued that management staff are guilty of mismanagement of the water systems, including finances, and that explains their unwillingness to hold meetings with customers to render accounts of the water revenue. For example, following the issuance of the fake receipts, some household members indicated that if the community members were educated about the water system, especially billing and receipting, and if regular meetings were held with community members, the issuance of fake receipts could have been averted. This suggests that trust in management staff is a function of transparency and information sharing on management activities. Besides the core management staff (WSMT and operating staff), the study also assessed the performance of water vending.

6.4.2 Household assessment of vending performance

Table 6.17 shows households' assessment of vendors' performance in terms of their presence at the stand-posts, cleanliness around the stand-posts and enforcement of vending rules. The assessment of the vendors' performance was not limited to households who use the stand-posts because the pre-test revealed that some households connected water to their compounds because of vendors' performance and attitude (non-availability at the stand-posts and derogatory remarks from vendors).

Table 6.17 Households' perception of vendors' performance

Scale	Babile	Busa	Gwollu	Daffiama	Average
Very Good	21.4%	38.1%	25.6%	0.0%	25.6%
Good	50.0%	57.1%	25.6%	37.5%	39.0%
Fair	21.4%	4.8%	20.5%	37.5%	18.4%
Bad	7.2%	0.0%	10.4%	25.0%	8.5%
Cannot tell	0.0%	0.0%	17.9%	0.0%	8.5%

Source: Field work, 2014

The ANOVA results show that performance of vendors differed significantly, $F(3, 78) = 4.486$, $P = 0.006$, between communities. Generally, vendors performed better in Babile and Busa relative to those in Gwollu and Daffiama, as shown in Table 6.17. This is because in some communities, such as Daffiama, water vending was virtually absent and due to lack of information about their

absence, households attributed it to lack of commitment to vending. Some households had to rely on sectional boreholes for water. All those who assessed vendors as good (39%) and very good (25.6%) explained that, they are often present at the stand-posts and maintain cleanliness around the stand-posts. The responses of those who rated vending as bad and as fair could be prejudiced because some households were not happy with some vending rules, such as no washing of basins at the stand-posts (elaborated in chapter seven). The FGD with vendors in Busa and Babile indicated that customers are not happy with them (vendors) because they enforced water fetching rules. This sometimes results in verbal assaults. This was confirmed by the WSMT and the operating staff. They, however, added that quarrels are common with fetching water and that the quarrels do not escalate because the parties reunite immediately after vending hours. The "do-nothing" approach may not be helpful in all water-related quarrels because repetitive and frequent stand-posts quarrels can grow into major conflict on access to water.

6.5 Governance dimension of the water systems

This section of the chapter presents the performance as regards the governance aspect of water management. At the operational level (community level) the WSMT is the body responsible for the overall functioning of the water systems. The members of the WSMT are constituted based on representatives from the various geographical sections of the communities. That is, each community has geographical sections and each section is expected to have a member representing the section on the WSMT. The WSMTs are expected to engage with the customers in decision-making and also render accounts of their stewardship to the customers. Therefore, for the purpose of this study, governance dimension is analysed based on the following: (i) sectional representation and user engagement; (ii) participatory decision-making; (iii) accountability and transparency in CBWM; (iv) ownership and control over the water systems and alternative water sources. The subsequent sub-sections present the outcomes of these variables.

6.5.1 Sectional representation and user engagement

Constitutionally, each section of a community is expected to have a representative in the WSMT. However, at the inception phase and immediately after completion of the water project, when almost all sections of the communities had representatives in the WSMTs, the interaction with the WSMTs and key informants show that despite the constitutional provision on representation, in reality some sections were not represented by the time of this study, with the majority of the sectional representatives having exited voluntarily. Households also had their views on the sectional representation in management, as shown in Table 6.18. The findings from the household surveys show that there is a balanced sectional representation in the management of the water systems, despite the specific community differences (see Table 6.18). From the households'

perspective, broad representation of the sectional members is high in Busa and Babile. This is partly because the water systems in these communities are relatively new and majority of the sections' representatives are still with the WSMTs.

Table 6.18 Households' perception of sectional representation in water management

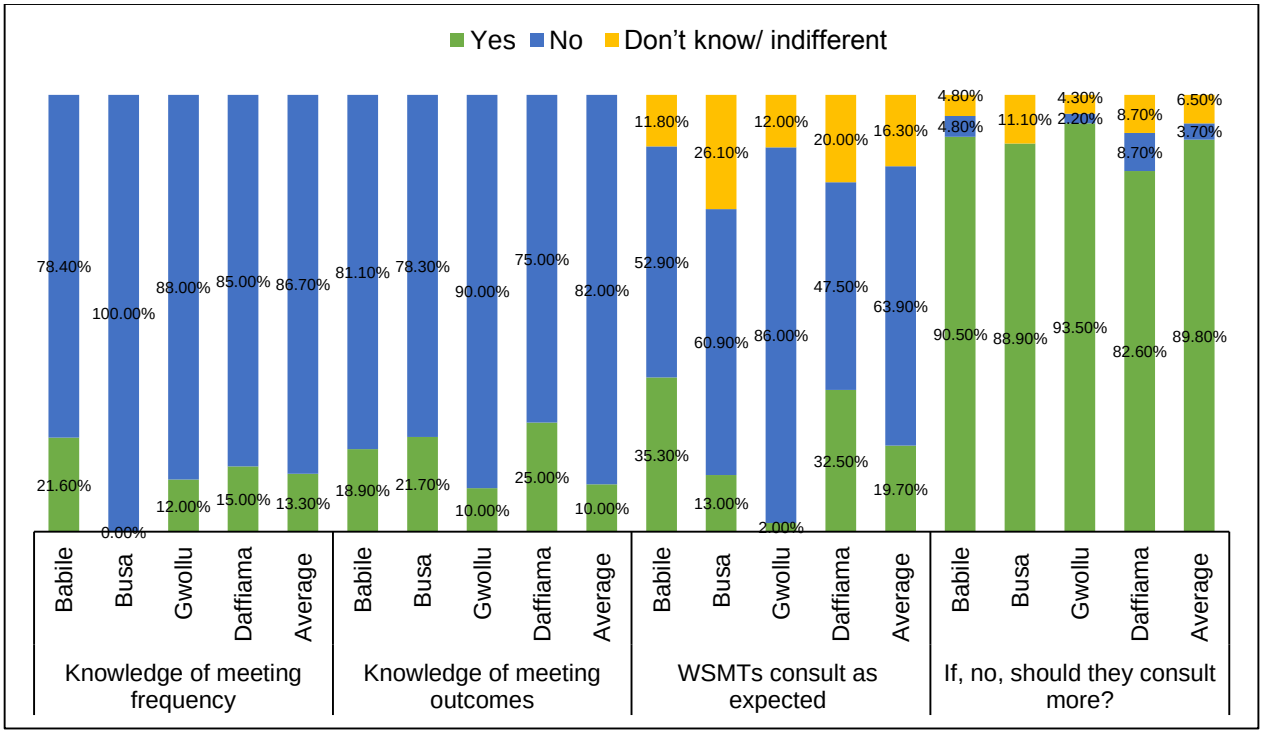
Level of Representation	Babile	Busa	Gwollu	Daffiama	Average
Highly Representative	29.7%	43.5%	8.0%	7.5%	18.7%
Somewhat Representative	43.3%	30.4%	40.0%	47.5%	41.3%
Not Representation	16.2%	26.1%	18.0%	45.0%	26.0%
Cannot Tell	10.8%	0.0%	34.0%	0.0%	14.0%

Source: Field work, 2014

On average, 26% of the respondents said there is no sectional representation in water management. The ANOVA results, $F(3,146) = 5.073$, $P = 0.002$, show a significant difference in households' perception of sectional representation between communities. There is low rating in Gwollu because the WSMT is currently run by one person while the others have been sidelined. The satellite communities of Busa and Babile are of the view that the WSMTs are not representative because their sections (separate communities) are not part of the management structures. During the launching of new water projects, the Regional CWSA indicated that there is provision for small town water services to be extended to communities nearby (within a 2km radius). However, it remains unclear whether such satellite communities should be treated as sections, in which case they can be part of the WSMT. Households in these communities indicated that they only consume water and do not know how the water is managed, thus they appear isolated from the CBWM and are acting simply as consumers.

Besides the sectional representation in management, involvement of community members in water management is a key principle of CBWM. However, the household survey revealed that on average, 58.7% of respondents said no meeting had been organised within the last twelve months while 33.3% could not remember any meeting between the community and the WSMT. Only 8% said there was a community meeting and this was in Daffiama and Babile. However, later discussion with management staff in Daffiama and Babile revealed that the meeting took place over twelve months ago. According to the WSMTs in Busa and Gwollu, they have not held any meeting with the community since 2010 and 2008, respectively. The households and the WSMTs indicated that communities only held meetings prior to the completion of the water projects to encourage members to contribute towards the capital cost. Figure 6.6 shows the household knowledge and views on user-management staff meetings.

Figure 6.6 Households' perception of community-management staff engagement



Source: Field work, 2014

In Figure 6.6, an average of 86.7% of the household respondents did not know the expected number of meetings to be held between management staff and the customers. No respondent in Busa had knowledge of the frequency of meetings. In Gwollu it was established that since 2008 there had neither been any user-WSMT meeting nor WSMT meeting. An operating staff indicated that *"if anybody says that they have been holding WSMT meeting then it is a two-man show"*[31] (Excerpts from FGD 27th February 2014). The operating staff, general community members and some WSMT members, maintained that the WSMT is handled by two persons, the chairman and the secretary. This was confirmed by a key informant who further indicated that there is an internal conflict within the WSMT. The validity of these assertions is supported by what was established during the preliminary visit, in the following statement: *"You do not need to meet the whole Board*[32]*, because even the two of us*[33] *can answer any question about the water system" (Excerpts from discussion during the preliminary visit to Gwollu, 17th July 2013)*.

This goes to support the above argument that only two people constitute the WSMT. There has been division among the WSMT in Gwollu for almost three years, but no intervention to resolve it.

[31] It was a meeting between only two people, presumably the chairman and the secretary.
[32] The communities, including the WSMT members and the operating staff still refer to the WSMT as Board, because the WSMT was called Water and Sanitation Development Board, popularly called the Water Board.
[33] Chairman and secretary, who were the only participants in the discussion during the preliminary visit.

Decisions on water management are taken without consulting other management staff or the general community. During an informal discussion with some female WSMT members, they revealed that the team members have not met for over three years and this was confirmed by the chairman of the WSMT. One saddened female WSMT member indicated that:

> *"Immediately after inauguration, we used to hold a quarterly Board meeting. But now, I tell you!! it is over three years since we held any meeting, and we cannot explain. Our name is Board Members[34], but we do not know anything about the water system, including its finances. Community members alleged that the chairman and the Board members spend water money. So we are also called, "Money spenders". We wanted to take some steps to redeem our image. We wanted to mobilise ourselves to find out from the Chairman why he has not been convening meetings. We also planned to call our section members to inform them that we do not know anything about the Board any longer, and together with the section members, call the Chairman to come and explain how the Board operates. But some members within the Board asked that we should hold on. We are still waiting…" (Excerpts from discussion with aggrieved WSMT members, 2nd March 2014).*

According to a WSMT member, who requested a suspension of intended actions of the aggrieved WSMT members, the WSMT is fragmented and there are plans to meet with the District Assembly for intervention. According to the aggrieved members, the District Assembly has not played its role although they are customers to the water system. Interestingly, these women's names were listed as members of the WSMT. The Chairman on the other hand contended that WSMT members requested an increase in their sitting allowance and indicated that the revenue of the water systems cannot support their request. This also implies that not all the members of the WSMT are privy to the detailed inflow and outflows of the water finances. As at the time of the research, there was still division within the WSMT.

At the household level, although the majority of the respondents do not know how often the WSMT should hold community meetings, 63.9% think that the management staff do not consult the community members as expected (see Figure 6.6 above). They argue that once the water system belongs to the community, and not all members can directly serve as staff of the water system, those who are privy to be staff should properly inform the rest on activities and seek further advice. To further explain the need for WSMTs/operating staff to consult the community members, a retired educationist rhetorically asked the Researcher:

> *"Why do chiefs have a council of elders or why does the president have council of state? It is to tap the knowledge of others in governing their jurisdictions. While it may not be practical to hold meeting with the larger community, the sectional heads could be used" (Excerpts from HHS, 1ST March 2014).*

Interestingly, two key informants in separate communities added that community members should have a stake in water management, and a good management staff should be interested in

[34] That is how community members call them but sometime it is mere mockery.

receiving complaints from the lower level/customers to help improve the management practices. For them, a community meeting is an avenue that promotes accountability and transparency over water revenue. Currently, many customers including they (key informants) do not know how the water revenue is managed.

6.5.2 Participatory decision-making

Major decisions such as tariff review are expected to be taken jointly with the community members during a forum. It has been established that where communities' members are involved in the decision-making process, members often cast vote in situations where there is no initial consensus. The democratic (simple majority rule) based decision-making is to ensure harmony in the community and compliance with decisions. This was practiced during the mobilisation phase of the water project. However, after completion of the project, the management staff usually take decisions without consulting the general community members: they take major decisions and disseminate it to the general community. The non-involvement of the community members in decision-making is reflected in household responses (see Table 6.19).

Table 6.19 Households' views on mode of decision-making

Mode of decision-making	Babile	Busa	Gwollu	Daffiama	Average
WSMT takes and informs customers	21.6%	69.6%	64.0%	45.0%	49.3%
Customers and WSMT deliberate and take decision together	32.4%	13.0%	6.0%	30.0%	20.0%
WSMT hold discussion, consult customers and decide together	10.8%	0.0%	4.0%	0.0%	4.0%
WSMT takes decision with outside agencies	0.0%	0.0%	2.0%	0.0%	0.7%
Not with customers, but don't know how decisions are made	35.2%	17.4%	24.0%	25.0%	26.0%

Source: Field work, 2014

Generally, 49.3% of the respondents indicated that WSMTs take decisions and inform the community members. Another 26% of the respondents are sure that the WSMT does not involve community members but could not explain how decisions are made. In Babile, the WSMT indicated that fixing of reconnection fees and tariff setting were arrived at during a community-WSMT meeting. Probing on this issue revealed that the meeting was held in 2010, shortly after completion and handing over of the water system to the community. Similarly, in Daffiama some households (those with private connections) do recollect holding a meeting with the WSMT during which they all agreed to disconnect all defaulters. However, this took place over twelve months ago, as later established from the management staff. Therefore, the four cases use similar approaches to take decisions on water management.

The setting of tariff confirms the views on participatory decision-making. According to the FGDs with the management staff, for the past 12 months decisions on tariff were taken and disseminated to the general community through public announcements in mosques/churches and the vendors. There has not been an opportunity for community members to deliberate on proposed tariffs, neither has there been any review of tariffs by the District Assemblies. This was confirmed during the regional FGD. Immediately after completion of the water projects, community members were involved in initial tariff setting. However, subsequent adjustments did not involve them. A member of a WSMT argued that the general community is not involved in such decisions because there will never be consensus during the forum. Certainly, participatory decision-making is costly. As such, WSMTs are not willing to be subjected to such a costly (time and moderation of community forum) decision-making process. Table 6.20 shows the households' participation in taking major decisions, such as tariff setting, selection of WSMT members and decision on the amount of capital contribution per household/head.

Table 6.20 Households' participation in major decision-making

Decision	Participation Status	Babile	Busa	Gwollu	Daffiama	Average
Tariff setting	Did not participate	54.1%	95.7%	98.0%	82.5%	82.7%
	Participated	32.4%	0.0%	2.0%	7.5%	10.7%
	Don't remember	13.5%	4.3%	0.0%	10.0%	6.7%
Selection of WSMT members	Did not participate	59.5%	78.3%	94.0%	85.0%	80.7%
	Participated	24.3%	17.4%	4.0%	7.5%	12.0%
	Don't remember	16.2%	4.3%	2.0%	7.5%	7.3%
Capital contribution	Did not participate	18.9%	21.7%	78.0%	85.0%	56.7%
	Participated	64.9%	73.9%	20.0%	10.0%	36.7%
	Don't remember	16.2%	4.3%	2.0%	5.0%	6.7%

Source: Field work, 2014

In Table 6.20, there is little participation of households in tariff setting and selection of WSMT members. However, there is relatively high participation in capital contribution. In Babile and Busa, it was only the satellite communities which did not participate in capital contribution. Hence, all household respondents in the satellite communities indicated that they did not participate in capital contribution. Discussions with the WSMTs confirmed that they were not part of the capital contribution. In Gwollu and Daffiama, the households started but the District Assemblies later paid for the community contribution. The DWST indicated that communities were facing challenges in raising the capital contribution. As such, the District Assemblies paid on behalf of the communities in order to expedite the implementation process of the water projects. This tends to defeat the policy orientation of inculcating a sense of ownership in the communities through a capital contribution.

The household survey confirmed what was said during the FGDs about participatory tariff setting. Only 10.7% of the respondents ever participated in tariff setting, although it took place over a year. Despite the non-involvement of community members in decision-making, especially tariff setting, there is low community protest over decisions taken by the management staff. Table 6.21 shows the responses of households on community protested over decisions made.

Table 6.21 Households' views on community protest against major decisions

Response	Babile	Busa	Gwollu	Daffiama	Average
Yes, always	0.0%	0.0%	6.0%	0.0%	2.0%
Yes, sometimes	10.8%	21.7%	20.0%	27.5%	20.0%
Don't know	32.4%	56.6%	26.0%	42.5%	36.7%
Never	56.8%	21.7%	48.0%	30.0%	41.3%

Source: Field work, 2014

As shown in Table 6.21, 41.3% of the respondents were confident that community members never protested against the decisions of WSMTs or operating staff. According to 36.7% of the respondents, they have not heard of any protest against the WSMTs or operating staff but were not certain that it had never happened. For those who mentioned that there were protests, the nature of protest took the form of sectional or group based complaints. They were never organised protests or openly addressed to WSMT or operating staff. Such protest had little impact on water management and could not also rescind the decisions made by management staff. However, there is the possibility that as customers grumble, it could lead to open protest if their concerns are not addressed. Besides participatory decision-making, another governance performance area relates to accountability of managers to other actors, and transparency in management activities.

6.5.3 Accountability and transparency in CBWM

Accountability and transparency within and across the multiple levels of actors are important drivers of a successful water management. Based on the analysis on decision-making and user-WSMTs engagement, it is evident that at the operational level the management staff do not account to the general community. On the other hand, community members do not have a consistent demand for accountability. According to the operating staff in Gwollu, Babile and Daffiama, the practice is that, community members are silent and do not seek accountability on water management if they have access to water. However, any shortage of water for more than two days (with or without explanation from management) often initiates demand for accountability. As one operating staff indicated, anytime there is water shortage, some sections of the community threaten with statements such as:

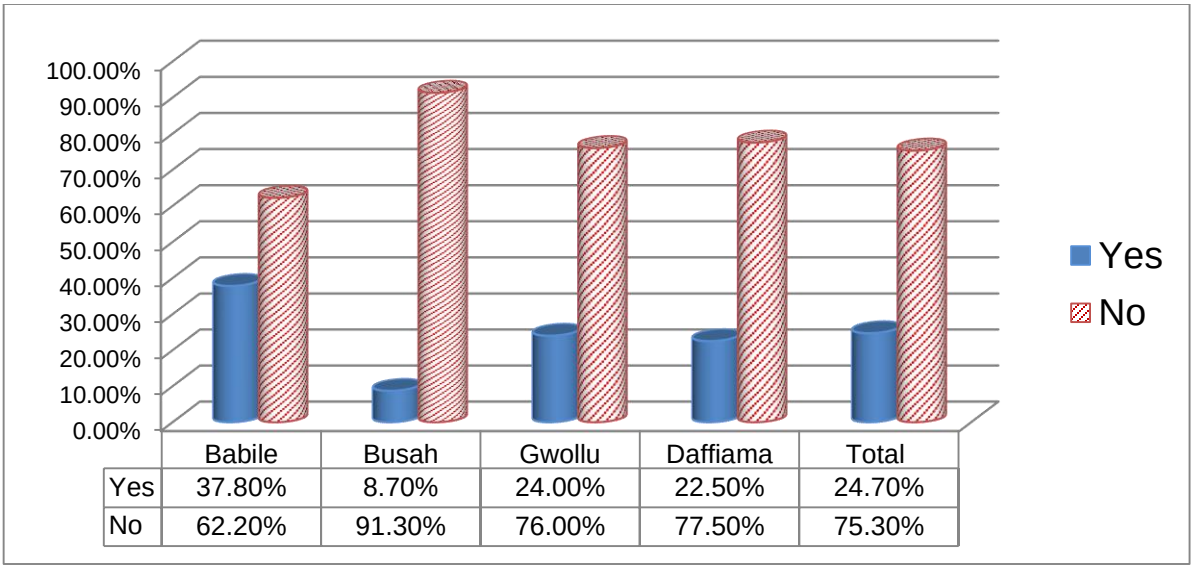
> *"We need to fire all the management staff. We have to reconstitute the Board, because they have over stayed in office. Are they the only people in the community who can manage the water system? There are better managers" (Excerpts from FGD, 27th February, 2014)*.

According to an operating staff, the community members do not understand the effects of surrounding factors, especially power outages, on water production. This implies that the agitation is often as a result of lack of information about water shortage. This was confirmed by a vendor during a FGD. She remarked that the concern of the community members is not so much on non-availability of water, but lack of information on the causes of the shortage. Similarly, a key informant in Gwollu indicated that transparent communication with community members about the nature of problems and their ability or inability to rectify the problem, can win public sympathy. Moreover, giving information on the likely downtime allows customers to search for alternatives during any breakdowns. Information sharing is, thus, a key requirement in devising adaptation strategies during breakdown. Tensions will arise if the customers are unable to adjust to changes in water availability, amidst lack of information.

The observation at the time of the field work in Gwollu confirmed the need for better communication. The Researcher observed that during the breakdown of the water system in February 2014, some individuals went on a local radio station to speak against the management staff and made open statements that demanded accountability. An opportunity was given to the general public to make telephone calls to the Radio programme to express their opinion on Gwollu water management. These agitations emerged because the WSMT could not self-organise to restore the water system. This resulted in a long downtime (about three weeks), and the District Assembly had to help finance the repair works. The agitation was not limited to the operational level. The District Assembly office block and the staff of the Assembly solely depend on the Gwollu water system for water needs and, as such, were severely affected by the breakdown. This also prompted the authority of the District Assembly to request the WSMT to render accounts of their stewardship. This was made known when the District Chief Executive was responding to questions during the launch of new water projects. Interestingly, it was observed that the agitations in the community died off after the water system was restored. The observation at the time of the field work in Gwollu raises questions on the channels of information flow of the water systems.

In addition to information on water supply and management, accountability and transparency concerns of households revolve around knowledge of the billing method and the usage of water revenue. Household knowledge of the method of billing is generally low across the communities. On average 75.3% of the respondents do not understand the method of billing or computation of bills. Figure 6.7 shows the households' knowledge of how water bills are computed.

Figure 6.7 Households' knowledge of billing methods



	Babile	Busah	Gwollu	Daffiama	Total
Yes	37.80%	8.70%	24.00%	22.50%	24.70%
No	62.20%	91.30%	76.00%	77.50%	75.30%

Source: Field work, 2014

In terms of community specifics, lack of knowledge ranges from 62.2% in Babile to 91.3% in Busa. The high proportion in Busa is partly due to large dependence on stand-posts, where the mode of payment is pay-as-you fetch. Hence, the households are not privy to the computation of the bills. The FGD with vendors revealed that they do not understand the billing methods as a result of illiteracy. However, to ensure transparency, the billing sheets are left with the vendors while copies are kept with the revenue collector. According to the revenue collector in Busa, this practice is to allow vendors to cross check the computation with the assistance of a literate, if they so desire. This is contrary to what pertains in the other communities, where the billing sheets are not left with the vendors.

A cross tabulation of knowledge of billing and gender of respondents shows that out of those who have knowledge of the billing method, 67.6% are males while the remaining 32.4% are females, although women are mainly paying for water services. There is significant difference, $F(1, 148) = 9.024$, $P=0.003$, between male and female knowledge of the billing method. Similarly, there is slightly significant difference, $F(1, 148) = 4.064$, $P = 0.046$, between those who had at least basic education and those who had no formal education. In other words, there is a relationship between formal education and knowledge of billing. From the household survey, 73% of those who had knowledge of billing methods have at least a basic education. This implies that those who had a formal education are relatively more knowledgeable on billing methods than those who had no formal education at all.

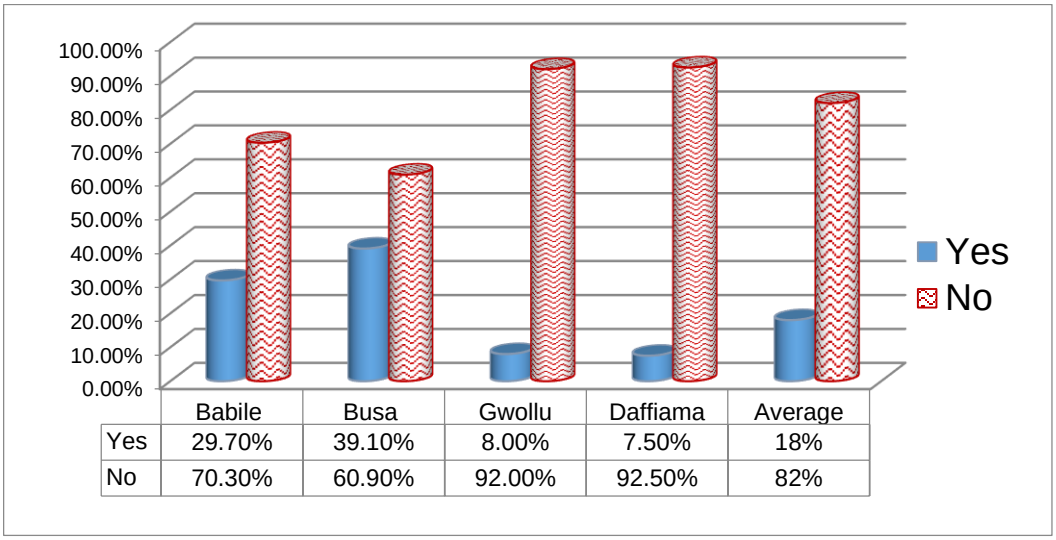
Nonetheless, some household respondents were disappointed that they had a basic level of formal education and yet the revenue collectors refused to teach them the billing method. For instance, when asked about their knowledge of billing methods, a woman had this to say:

> *"That is our biggest problem. We do not know and they have refused to teach us. At least some of us have been to school and with little education on billing method, we should be able to validate the calculations" (Excerpt from HHS, 11th March 2014)*.

There is a strong desire by community members to learn the method of computing water bills. This is because there is a strong discernment on the part of some customers that operating staff deliberately inflate the bills for subscribers to enable them divert the excess revenue for private benefits. Respondents who have at least a basic education but have no knowledge of billing could easily be educated on the billing method in order to ensure transparency in billing method.

The second major concern of community members is the use of water revenue. As shown in Figure 6.8, there is little knowledge of the use of water revenue. On average, 82% of respondents do not know the expenses of the water revenue. The proportion is high in Daffiama and Gwollu.

Figure 6.8 Households' knowledge of revenue usage



	Babile	Busa	Gwollu	Daffiama	Average
Yes	29.70%	39.10%	8.00%	7.50%	18%
No	70.30%	60.90%	92.00%	92.50%	82%

Source: Field work, 2014

Those who have knowledge of revenue usage speculated that it is used to finance operation and maintenance, including staff salaries. Although many respondents do not know the use of water revenue, statistically, the ANOVA results showed that there is significant difference, $F(3, 146) = 6.131$, $P = 0.001$, among communities. As shown in Figure 6.8, knowledge in Gwollu and Daffiama are far below the average knowledge in the four communities. This implies that they could be more suspicious of financial mismanagement.

The current state of accountability and transparency in water management necessitates an exploration of the ownership and control dimensions of CBWM. That is, it is important to examine whether communities really own the water systems and who has absolute control over the water systems as well as other public water resources. It is expected that if they own the water systems, they should be abreast with its finances.

6.5.4 Ownership and control over the water sources

Ownership: Ownership of the water systems has been a source of confusion. According to the national and regional CWSA, legal ownership of the water systems rests with the District Assemblies. Accordingly, public resources were used to provide the water systems and then allocate them to communities. Thus, ownership rests with government, who is represented at the local level by the District Assemblies: the communities are holding the water systems on behalf of, and in trust for, the District Assemblies (government). They further indicated that the initial idea of community contribution towards capital cost was to let communities feel part of the water projects and take responsibility for managing it, as part of the shift towards community management. This was corroborated during the regional FGD where the regional and district level staff emphasised that the underlying assumption is that devolving water management to communities will create a sense of ownership in them and make them accountable to the community members. As regards transferring legal ownership to communities, they indicated that entrusting legal ownership to the respective communities potentially eliminates the role of the government (District Assemblies) in serving as a referee, especially in the event of any conflict.

Contrary to the above explanations, all four communities and the operational level management staff during the regional FGD maintained that the *communities* own the water systems, irrespective of the legal contentions. They contributed towards the construction and it was also emphasised during the commissioning that the water systems "*belong"* to the community. The views of the household were also sought as regard the ownership of the water systems. It is important to establish whether communities really have a sense of ownership, as advanced in the literature. Table 6.22 shows the views of households on the ownership of the water systems.

Table 6.22 Households' perception of ownership of the water systems

Perceived Owner	Babile	Busa	Gwollu	Daffiama	Average
Community	27.0%	26.1%	56.0%	37.5%	39.3% (59)
WSMT/operating staff	13.6%	39.1%	16.0%	5.0%	16.0% (24)
Government (District Assembly)	10.8%	17.4%	14.0%	15.0%	14.0% (21)
NGO	0.0%	4.4%	0.0%	2.5%	1.4%(2)
Don't Know	48.6%	13.0%	14.0%	40.0%	29.3%(44)

Source: Field work, 2014

As shown in Table 6.22, 29.3% of respondents could not indicate the owner of the water system. A higher proportion (39.3%) mentioned the community as the owner of the water system. Three main reasons were given for community ownership. Out of the 39.3% (59 respondents), 50.9% of them indicated that community members contributed money towards the construction. Another 25.4% of the 59 respondents indicated that during the commissioning of the water system (a ceremony), it was mentioned that the project (water system) belongs to the community and, as such, members should be responsible for its operation and maintenance. Accordingly, this was the basis of using individuals from the community to manage it. Finally, 23.7% of the 59 households indicated that any resource that is located within the community and where its access is not limited to particular individuals, then that resource belongs to the community. For these people, the water services are opened to all community members, depending on one's ability to pay for it.

Interestingly, 16% (24 respondents) indicated that the WSMTs/operating staff own the water system. Out of the 24 respondents, 79.2% of them mentioned that the management staff are directly responsible for daily operation of the water system and they take major decisions, such as tariff setting, about the water system. The remaining 20.8% said the water system belongs to the WSMT/operating staff because the water bill payment receipt bears the name of the specific community WSMT, thus, suggesting that *they* are the owners. This means that these people are not able to draw a link between the WSMT and the general community. In other words, they barely see the WSMT as representing the community. This may be attributed to lack of user involvement in decision-making and the general absence of downward accountability in water management. In some communities, the households tagged the stand-posts to the vendors' name, and such situations are basically "ownership by identify"[35]. Basically, those who mentioned the Government as the owner maintained that public resources reside in the government, and government decides which community can benefit from it, using its allocation powers. The views of these people lend support to the reasons given by the CWSA staff and the DWSTs.

Control power: There are divided views on ownership, although majority mentioned community as the owner of the water systems. Given that accountability is essentially absent and community members do not take part in decision-making, it is important to understand households' views on the most influential person or organisation over the water systems. Table 6.23 shows the households' perception of who controls the water systems.

[35] That is, the respondents mention the name of the vendor of the stand-post as the owner and do not immediately link the stand-post to the general production and distribution system.

Table 6.23 Households' perception of who controls the water system

Who has control over the water system?	Babile	Busa	Gwollu	Daffiama	Average
Traditional Authority & Elders	13.5%	13.0%	2.0%	15.0%	10.0%
Management staff	62.2%	60.9%	78.0%	60.0%	66.7%
DA/Government	13.5%	4.3%	12.0%	5.0%	9.3%
General community	8.1%	0.0%	4.0%	10.0%	6.0%
Diaspora	0.0%	21.7%	0.0%	5.0%	4.7%
Don't know	2.7%	0.0%	4.0%	5.0%	3.3%

Source: Field work, 2014

An average of 66.7% of the respondents mentioned WSMT/operating staff as most influential and those who control the water systems. The proportion is higher in Gwollu. Accordingly, management staff mainly take and implement decisions about the water systems. For those who indicated Traditional Authorities as controllers, they related level of control to their roles during the inception phase of the water project and in selecting members to constitute the WSMT. In Busa, some respondents (21.7%) mentioned some citizens[36] of Busa who reside outside Busa as most influential over the water system. It was established that these are individuals who played important roles during the mobilisation phase and are currently providing technical advice to the management staff. Only 6% of the respondents mentioned the general community as the most influential body because they decide who should form part of the management staff of the water system.

The policy directive is that, all public water resources (dug outs, boreholes with hand pumps, public hand-dug wells with/without hand pumps) are to be controlled by the WSMTs, but the views of households were limited to control over the water systems. As regards general public water sources within a community's jurisdiction, the WSMTs in consultation with the community members, are required to set up the right institutions (rules, norms, bye-laws) to regulate these water bodies, and at the same time ensure the functioning of the water systems. The study found that prior to the construction of the water system, these water sources, especially boreholes with hand pumps, were controlled by sectional committees, mostly the Water and Sanitation Committees (WATSANS). Despite the legal provisions, no WSMT has been able to take over the control of other water sources since the establishment of the water systems. According to the WSMTs, sections where the water sources are located have refused to relegate management to the WSMTs. Although unexpected, the sections were backed by the Traditional Authorities in some communities, requesting that sectional facilities should be managed by their respective

[36] Some community members in the diaspora who are professionals in the water sector and are constantly in close contact with the community (their original home) periodically provide technical and professional advice to the management of the water systems.

sections. A WSMT member indicated that: *"for security[37] reasons, we have decided to allow the management of other water sources, other than the water system, to the respective sections"* (Excerpts from FGD, 12th March, 2014). Traditional Authorities are revered structures in the communities and they are custodians of the land. As such, the WSMT may be perceived as disrespectful and could attract sanctions should they (WSMT) go against the Traditional Authorities' request.

Moreover, some of these water sources were constructed by benevolent persons or organisations without channelling them through the District Assemblies. The regional level FGD revealed that community members are aware of the historical basis of such boreholes and it becomes difficult for the WSMT to take control of such water sources. Consequently, in all the communities, the WSMTs' activities are limited to the water system, while the boreholes with hand pumps are managed by the respective sections. These sections contribute monthly towards operation and maintenance costs of the boreholes. The households pay monthly a borehole fee (ranging from GH¢1.00 to GH¢2.00) for maintenance and this is below the average monthly water bills (GH¢22.19) for those who use the piped system (see section 6.2.1). Some households with indoor taps also pay the borehole fee in order to reduce expenditure from indoor taps and guarantee all-time access in the event of a failure of any of the sources of water. These practices, according to management staff, have affected the effective utilisation and revenue of the water systems.

Additionally, some households rely on the piped water for drinking/cooking and use the hand-dug wells for other purposes (see Box 6.1 above and Figure 6.9 below). This is most common in Babile and Daffiama. In Babile, two households were questioned why they recently dug wells when they have piped water in the community. Coincidentally, they independently shared similar views. They indicated that the investment cost of the hand-dug well is high. However, the long term benefit is greater. They dig wells as a response to the high tariff and in the event of a breakdown of the water system. One of them asked rhetorically: *"can you tell a visitor to your house that the water system has broken down and, as such, he/she cannot get water to bath?"* (Excerpts from HHS, 9th January 2014). This implies that the alternative sources also serve as water security for the households. Although a good strategy for the household, it has implications on the effective demand for water from the water systems. According to the management staff, as many households acquire HDWs and benevolent persons (including politicians) continue to supply boreholes without reference to institutional procedures, it reduces dependence on the piped water and this has consequences on revenue generation.

[37] The fear of the unknown for arguing with Traditional Authority over water source management.

Figure 6.9 Alternative sources of water

Gwollu: Borehole with hand pump (supplied by Catholic Relief Service) serving multiple uses.

Babile: A girl fetching water from a compound hand-dug well for laundry purpose.

Source: Field observations, 2014

While the management staff are struggling to adjust to the presence of alternative water sources, it has been established that there is internal black marketing of water, private subscribers sell water to other households sometimes without the knowledge of the management staff. This is carried out by some households with private connections. This happened in all the communities in varied forms. For instance, during the household survey, it was established that a private subscriber in Busa was engaged in vending through the indoor tap. However, she had to stop because she ran at a loss. In Babile, internal black marketing was detected when it was noticed that a vendor had extremely low sales over a period. It was established that the vendor had an indoor tap, and decided to sell water from the stand-post at GHp20.00/basin, and water from her indoor tap at GHp10.00/basin. This attracted customers to her indoor tap. Interestingly, a smaller basin was used as a yard stick for vending from her tap, to ensure that she did not run a loss since she had a profit making motive. Although she paid the bills, the WSMT was deprived of the real revenue that would have been realised from the stand-post. In other words, what she earned as profit was at the expense of the WSMT. These activities could have been immediately halted had there been effective and regular monitoring and information sharing.

Similarly, in Daffiama, internal marketing was going on at the time of the research. While in Babile, the management claim to have tracked and stopped an internal black water market, in Daffiama, the staff indicated that they are unable to monitor those who engaged in it. Moreover, there are no rules barring such practices, as indicated by management staff. Accordingly, it is at the discretion of the customers to decide where to patronise water services. Similarly, internal black marketing exists in Gwollu and the WSMT claimed to have verbally cautioned those involved in such practices to stop or be billed at a commercial rate. This has not taken effect and the practice was on-going at the time of the research. Generally, although the majority of households

mentioned management staff as the main controlling actors, in reality, the management activities suggest that they are not in absolute control over all aspects of the water systems.

It is worth emphasising that the initial ideology of decentralising resource management to communities is also to ensure accountability and also ensure that the resources are generally managed properly. This is based on the assumption that communities are close to it and understand the local conditions surrounding the resource. However, the empirical findings, with regards to accountability and transparency over the resource management, user satisfaction and ownership structure of the water resources, make it necessary to explore the success of CBWM from the customers' perspective. Table 6.24 shows respondents' views on the success of CBWM in their respective communities.

Table 6.24 Households' opinion on the success of CBWM

Response	Babile	Busa	Gwollu	Daffiama	Average
Successful	54.1%	65.2%	32.0%	40.0%	44.6%
I don't know	13.5%	17.4%	22.0%	27.5%	20.7%
Unsuccessful	32.4%	17.4%	46.0%	32.5%	34.7%

Source: Field work, 2014

From Table 6.24, an average of 44.6% of respondents assessed CBWM as successful while 34.7% assessed it as unsuccessful. Success rates are higher in Babile and Busa. Several reasons have been given to justify the successes or failures of CBWM, as presented in Table 6.25.

Table 6.25 Households' explanation to the success state of CBWM

Successful, reasons	Multiple responses	Not successful, reasons	Multiple response
No frequent breakdowns	47%	Water shortage	49.6%
Better than previous management	12%	No transparency and accountability	80.4%
Access to water	68.5%	Tariffs are set arbitrarily	37.8%
Availability of vendors	13%	Management staff are not proactive	21.3%

Source: Field work, 2014

It was found, based on the interaction with those who assessed CBWM as successful, that they compared the current water supply situation to the periods prior to the establishment of the water systems. Success of CBWM is based also on access to water. As shown in Table 6.25, 68.5% of them maintained that they are able to get water in most of the times and that is a sign of successful management. On the other hand, an overwhelming 80% rated CBWM as unsuccessful due to lack of transparency and accountability in water management. Accordingly, the WSMT and operating staff do not account for their stewardship and the community members are essentially uninformed

of water management. Another 21.3% stated that the staff members are not proactive in addressing water management problems. For these people, management has not been able to put in place contingency measures to ensure that during breakdowns, they are able to provide a timely response. In summary, success of CBWM from the user perspective depends on the availability of water. On the other hand, customers who are concerned about *how* the water is managed assessed success of CBWM based on accountability and transparency in water management.

6.6 Conclusion

This chapter has demonstrated that the management staff solely depend on the water systems as their source of revenue for financing their activities. However, there are revenue losses through several sources, including technical inefficiencies. In terms of user participation, the management staff have not engaged the community in decision-making, neither have they been accountable to them. This has led to mistrust in water management, especially in communities with financial misappropriation records. Notwithstanding the lack of information on usage of water revenue and transparency in tariff setting, the households remain committed to paying their water bills, recognising the importance of water services. Given the performance analysis of the water systems, it is evident that in many of the indicators, there are performance lapses. A deeper understanding of the performance challenges requires an analysis of the institutional set up. In water system management, it is not enough to examine only performance indicators: the structural sources of these performance indicators equally need to be assessed. In that respect, the next chapter analyses the institutional arrangements for CBWM and how the various actors execute their mandate in relation to the institutional arrangements.

7 Institutional arrangements and existing practices

7.1 Introduction

This chapter analyses the institutional arrangements, existing management practices, and the drivers that impact on community-based water management (CBWM) in small towns. The chapter analyses how the actors of CBWM interact and the rules that guide their interactions. Such an analysis provides an explanation of the performance of the water systems that have been analysed in chapter six. The remaining sections of the chapter are organised into four main sections. Section 7.2 analyses of institutional arrangements for CBWM, the actors and their functions in CBWM, and the rules that regulate their actions. Section 7.3 analyses the actual management practices in relation to the rules. In line with the analytical framework in chapter four, the rules are analysed based on Ostrom's rules categorisation. Section 7.4 analyses the functions (monitoring, coordination and capacity building) of the regulatory level. Based on the analysis of the above sections, section 7.5 teases out the drivers that impact on the water systems and the adaptive measures in place to overcome these drivers.

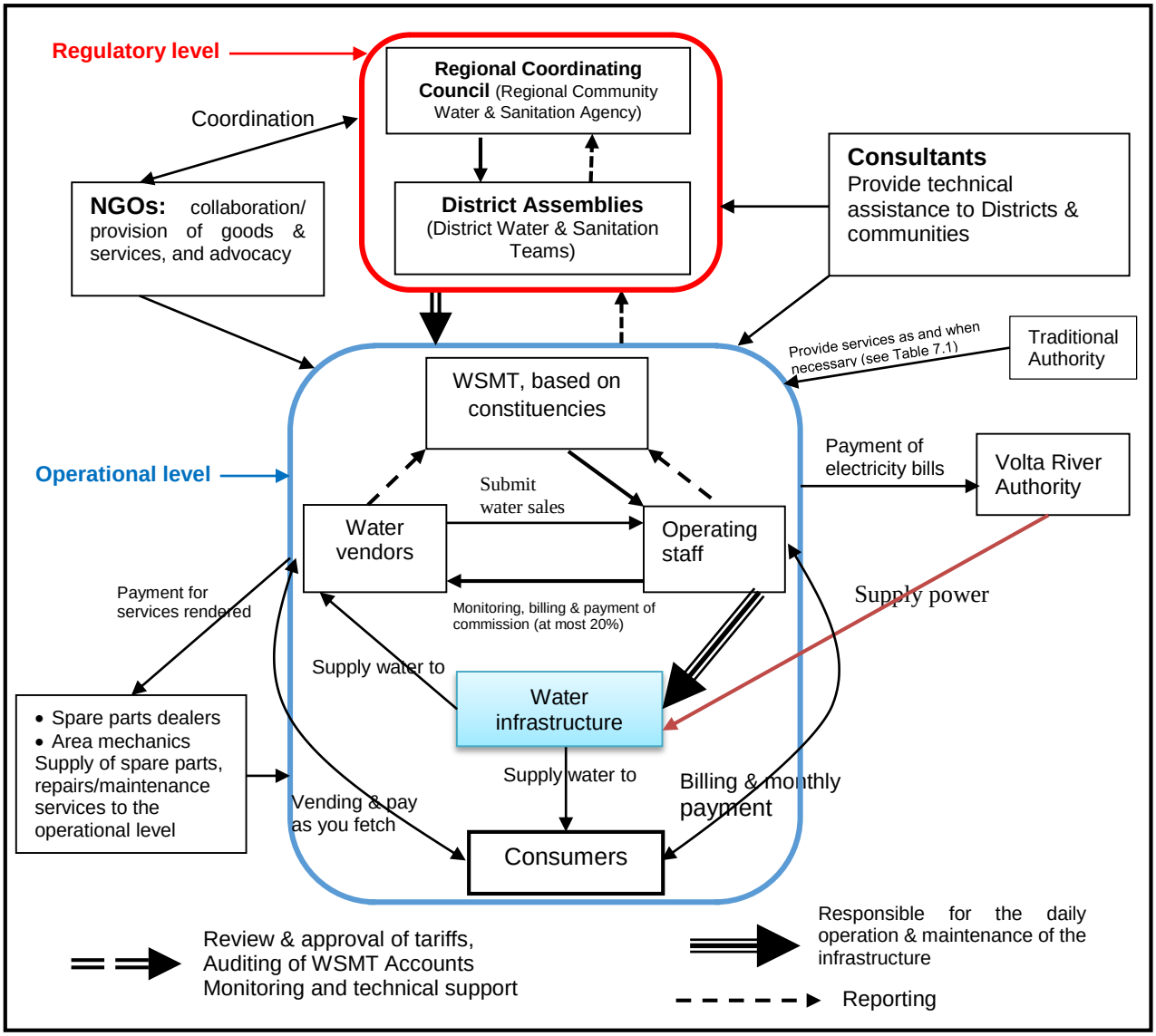
7.2 Analysis of institutional arrangements for CBWM

The essence of this section is to identify and examine the actors and their functions in CBWM, the relationship among them, and the rules that shape their interaction. It is divided into two main sub-sections: the actors and the rules.

7.2.1 Actors in CBWM

The management of the water systems is strongly handled at two major levels: the operational level (community-level) and the regulatory level (District and Regional level). At both levels, there are a number of actors who are expected to interact according to a set of rules to ensure the functioning of the water systems. Figure 7.1 shows a schematic relationship which was constructed during the regional FGD and Table 7.1 shows a summary of the functions that each actor is expected to perform.

Figure 7.1 Relationship among actors in managing small town water systems



Source: Author's construct based on regional stakeholder interaction, FGD. July 2014

Table 7.1 Functions of actors at different levels

Level	Actors	Responsibilities
Operational level	WSMTs	• Liaise with DWSTs to recruit operating staff and determine their salary. • Review and monitor the activities of the operating staff. • Take major decisions about the water systems in consultation with the community members and the DWSTs. • Oversee the functioning of the water systems and report to the DWSTs. • Set tariff to cover operation and maintenance, replacement and expansion costs. • To set application procedures, connection and re-connection fees for service connections.
	Traditional Authority	• Assist the WSMTs in enforcing water management bye-laws. • Support WSMTs to convene community meetings. • Release land for expansion of the water systems. • Settle water-related disputes.
	Operating staff and vendors	• Answerable to the WSMTs and to report the status of the water system to the WSMTs. • Production and distribution of quality water. • General maintenance of the water system to reduce water loss. • Where applicable, pay for the services of Area Mechanics. • Billing and water revenue collection. • Prepare the system towards expansion. This includes the preparation of facility management plans together with the WSMTs and the DWSTs. • Vending of water through the stand-posts.
	Consumers	• Payment of water bills based on the quantity of water consumed. • Report breakdown or fault to operating staff. • Hold management staff to account for water management.
Regulatory level	DAs (DWSTs)	• To monitor operation and maintenance of water systems in terms of financial, technical and administrative performance in their jurisdiction. • To ensure periodic water safety monitoring on all water supply systems. • Provide technical advice/support on water related activities. • Build the capacity of WSMTs and operation staff. • Periodically audit WSMTs accounts. • Review and approve tariffs for WSMTs. • Settle water related disputes in communities.
	Regional CWSA	• Monitor and coordinate all water activities in the region. • Set standards for the water sector. • Build the capacity of DWSTs and other stakeholders in the districts and the community levels. • Promotes and disseminates information about water-related activities.
Partners in water services delivery	Volta River Authority	• Supply hydro-electric power to the water infrastructure. • Issue electricity bills to WSMTs.
	NGOs	• Capacity building of the regulatory and the operational level. • Advocacy services on behalf of the operational levels. • Supply of water facilities such as hand-dug wells and boreholes with pumps.
	Area mechanics[38], Spare parts brokers	• Area mechanics handle repairs works that are beyond the capacity of the operating staff. • The spare part dealers are private business persons who sell spare parts in the open market with little regulation.
	Consultants	• Provide services, including training, facilitate the preparation of constitutions, water and sanitation related education to the regulatory and the operational levels.

Source: Constructed from FGDs at the regulatory and operational levels, and the constitutions of WSMTs, 2014.

Operational level: As shown in Figure 7.1, within the operational level, there are three core management structures: (i) the WSMTs; (ii) the operating staff; and (iii) the vendors. These actors

[38] These are private individuals, who have been trained, sometimes by CWSA and DWSTs to provide technical services such as repairs and technical advices to the water sector.

manage the water systems on behalf of the communities and the District Assemblies. The WSMTs serve as the employers of the operating staff, and the operating staff are expected to report monthly on the status of the water systems to the WSMTs. The monthly reports enable the WSMTs to submit quarterly reports on the status of the water systems to the District Water and Sanitation Teams (DWSTs). The vendors are directly responsible for the operation of a component of the water systems, the stand-posts. Their prime duty is to sell water through the stand-posts and submit sales to the revenue collector (operating staff). Contrary to the operating staff, who receive a monthly salary, the vendors receive commission of not more than 20% of their sales. As shown in Figure 7.1, the operating staff and the vendors work directly under the WSMTs. As such, as far as water services are concerned, the *focal* bodies at the operational levels are the WSMTs. The regulatory level actors, especially the DWSTs, are expected to work directly with the WSMTs (see Table 7.1).

Regulatory level: At the regulatory level, the District Assemblies (DAs), the Regional Community Water and Sanitation Agency (CWSA) and the Regional Coordinating Council (RCC) are the actors. Specifically, the DWSTs and the CWSA are directly in charge of rural and small town water services delivery. The regional CWSA plays a lead role in providing technical support to the Districts to carry out water-related activities, serving as the technical advisor to the Regional Coordinating Council on water and sanitation activities. Interviews conducted with the CWSA staff indicate that within Ghana's decentralised system, the Regional CWSA is part of the RCC and works on activities relating to water and sanitation in rural and small towns. During planning and implementation of water projects, the CWSA works with the DAs (the DWSTs), who are expected to be in close contact with the communities, to provide quality assurance of services delivered. In other words, the CWSA does not engage in direct implementation but facilitates the implementation process through: capacity building, monitoring and evaluation, provision of relevant information to other stakeholders as regards water projects implementation, facilitation of release of funds for water projects implementation, and resolution of conflicts related to water development and management.

Partners: Besides the mainstream actors at the regulatory and operational levels, there are NGOs, consultants, area mechanics and other organisations who intermittently provide services to actors at both levels (see Figure 7.1). For instance, in terms of repairs, the norm requires the WSMTs to report on major faults, which are beyond the technical capacity of the operating staff to repair, indicating the details of the fault to the DWSTs. The DWSTs then instruct an area mechanic to attend to the fault. According to the DWSTs, the essence of reporting to the DWSTs is to enable them remain well-informed of the functioning of the water systems and to ensure that competent

area mechanics are deployed to the site. Payment for services rendered by the area mechanics is the responsibility of the WSMTs. The area mechanics are expected to give a feedback to the DWSTs on the nature of services rendered.

In terms of NGOs' support to the small town water sector, the Global Water Initiative (GWI[39]) supported Lawra and Nadowli District Assemblies with water quality testing toolkits, computers and accessories, and sponsored the training of DWSTs, which took place in Niger, on water and sanitation related modules. The essence of this capacity building was to enable the respective District Assemblies to continue with water quality tests after the exit of GWI. The discussion with the DWST in Lawra, confirmed by the operating staff in Babile, shows that the District was able to continue with water quality test after the exit of GWI. However, according to the DWST in Nadowli, after the first water quality test, there was no follow up quality test after the exit of GWI and the District Assembly attributes it to lack of funds.

There are legislative instruments which legitimize the execution of the functions assigned to the different actors in Table 7.1. At the operational levels, there are specific water systems' constitutions and bye-laws that regulate the execution of the above functions. The constitutions, although focusing on the operational levels, also make provisions for the role of regulatory level actors in CBWM. Beyond the water systems' constitutions, there are legislative instruments and guidelines in water services delivery. These include: (i) the Community Water and Sanitation Agency Act, Act 564 of 1998; (ii) Legislative Instrument, LI 2007 of 2011; (iii) Project Implementation Manual of 2014; and (iv) the Local Government Act, Act 462 of 1993. For instance, Act 462 of 1993 empowers the District Assemblies as the *planning and implementation* authorities within their jurisdictions, and this function includes the water sector. Specifically, on CBWM, section 7.2.2 analyses details of the rules that pertain to the operational and regulatory levels.

7.2.2 Community-based water management rules

This section presents the analysis of CBWM rules. This is to provide a comprehensive understanding of the management of the water systems and the basis of the actors' activities. In line with the analytical framework in chapter four, the rules that shape the actions and inactions of the actors were examined based on Ostrom's working rules, as shown in Table 7.2.

[39] The GWI works to improve water management policies, research, investment and knowledge resources for sustainable agricultural production and improved food security. One of its core principles is to maintain or improve water quality while conserving its use as a limited resource.

Table 7.2 Community-based water management rules

Rule classification	Research findings (a synthesis of FGDs and legislative provisions)
Position Rules	• Positions exist in three related bodies in CBWM: the WSMT, the operating staff and water vendors. • The WSMT shall consist of at least 10 and at most 15 members and 40% of the members shall be women. • There shall be an executive committee comprising at least 5 members to be formed out of the WSMT. • WSMT shall employ operating staff to directly operate the water system. • WSMT shall recruit vendors for all functioning stand-posts. • The District Assembly shall constitute at least a three-member team called the District Water and Sanitation Team to oversee the water and sanitation sector.
Boundary Rules	• Persons above 18 years and of sound mind are eligible for election/nomination into the WSMT. • Persons elected can serve a two-term of 4 years per term, and not eligible for re-election. • Operating staff and vendors must submit application to the WSMT/DWST and go through interview to be appointed. • Individuals can apply for change of position. That is, from WSMT to operating staff but one person cannot hold two positions. • A WSMT member can resign by giving a month written notice to the WSMT and the DWST. • A member who absents him/herself for 3 consecutive regular meeting shall be replaced. • Failure of a member to perform duties for any reason for more than six months shall be replaced, until the said person resumes. • Without prejudice to the provision above, a person appointed to fill a vacancy shall serve the remaining term of office. • Representatives, and not chiefs, shall be eligible for election/nomination to the WSMT.
Choice Rules	• No ex-officio member[40] shall hold any executive position in the WSMT. • District Assemblies shall conduct annual financial audit of the WSMTs and quarterly monitoring of the water systems. • The WSMTs shall operate three bank accounts and expense their finances in line with existing financial management legislations. • Vendors shall stay at the stand-posts during vending hours and shall not delegate children to sell water in their absence. • There shall be no washing of basins at the stand-posts. • Access to water at the stand-posts is based on pay-as-you fetch.
Aggregate Rules	• WSMTs in consultation with District Assemblies shall invest part of the revenue in viable ventures. • Sitting allowance of WSMTs shall be determined by the Team subject to approval by the relevant District Assemblies. • Tariff setting shall be in consultation with the community and the District Assembly. • Tariff shall be approved by the District Assemblies before implementation. • The WSMTs shall set application procedures, connection and re-connection fees for service connections. • The DWST shall assist the WSMTs to prepare water systems management plans to guide the operation and future expansion of the water systems.
Information Rules	• WSMTs shall report to the DWSTs at least twice a year or as the DWSTs may request.

[40] Ex-officio members are mostly the Assembly persons of the communities, representatives from some public sector agencies within the communities and representative from the Traditional Authority.
Every District Assembly consists of Assembly persons. **An Assembly person** is a non-partisan politician who is elected by universal adult suffrage, from a local government electoral area within the District.

Rule classification	Research findings (a synthesis of FGDs and legislative provisions)
	• WSMTs shall organise community meeting at least twice a year about the water system. • Dissemination of information about the water systems shall be displayed on public notice boards in the communities. • WSMTs shall hold ordinary meeting at least monthly. • DWSTs shall provide monitoring feedback to the WSMTs and the CWSA.
Pay-off Rules	• WSMTs shall be entitled to sitting allowance commensurate with their roles. • Operating staff shall receive a monthly salary. • Water vendors should be paid a commission (not more than 20%) of their sales. • Misbehaved individuals shall be given verbal warning, this is followed by written queries, and then suspension/dismissal if it persists. • Customers who fail to pay their water bills shall have their water supplies disconnected.
Scoping Rules	• There is no limit to the use of water (purpose and quantity) from the water system. However, different uses shall attract different rates.

Source: Regional level FGD, FGDs with management staff, and review of WSMTs constitutions (WMA, 2010, LDA, 2008, NDA, 2006)

The management employees of the water systems are expected to follow these rules. The rules are structured in such a way that they encompass all components of CBWM: the composition of management structures at the operational level, legitimised functions of the actors, the reward systems and sanctions, and how the operational level and regulatory level are expected to relate. The design of these rules, especially the constitutions, was facilitated by consultants. According to the WSMTs and the DWSTs, the consultants guided the WSMTs and the DWSTs to prepare constitutions and bye-laws. In each community, the specific fetching rules (see section 7.4.3 below) were designed by the operational level managers (WSMTs, operating staff and vendors) and communicated to the users. The subsequent sections analyses these rules and how they are executed in practice. That is, the section critically examines the extent to which management activities are informed by the rules.

7.3 Existing management practices in relation to the rules

The management functions (see Table 7.1) are expected to be shaped by the rules in Table 7.2. That is, the management functions take their legitimacy from the rules because the rules set out what action actors are permitted and/or compelled to do in CBWM. Therefore, this section analyses the existing practices as regards working with the rules, and for emphasis, to better explain the causes of the existing state of water systems performance.

7.3.1 Position and boundary rules

WSMTs: According to the DWSTs and the WSMTs, during the inception of the water projects, the sections of the communities were constitutionally required to submit candidates for the composition of the WSMTs. The essence of constituting WSMT prior to commencement of

construction is to enable them to oversee the construction phase[41]. This basic requirement was met in all the communities and according to the WSMTs, the sections presented their representatives based on their own criteria. The criteria include commitment to duty, availability of the person, and trustworthiness. The household survey and the key informant interviews (established in the previous chapter, section 6.5.2) revealed that in reality, it was the elders of the sections who nominated/selected the representatives onto the WSMTs. According to the key informants, the elders of the communities claimed to know the communities' members, in terms of the individuals' behaviours, including their commitment to duties than any other person and, as such, they (elders) are at a better position to select persons who will better serve the water sector. This mode of forming the WSMTs is confirmed by the fact that 80.7% of the households (see Table 6.20) did not participate in deciding on the selection of the WSMT members. In effect there is no general sectional (customers in the various community sections) participation in the selection/nomination process.

As part of the boundary rules, one person cannot hold both a position in the WSMT and as an operating staff concurrently: this is to avoid conflict of interest. Additionally, chiefs are not permitted to be part of the WSMTs, but can have representatives on the WSMTs. The absence of the chief is to create a level playing field for the members of WSMTs. There is compliance to these rules in all the communities, particularly with regards to entry into CBWM positions.

Additionally, the WSMTs have a four-year term mandate and after that renewal is based on performance and the DWSTs are expected to facilitate the reconstitution of the WSMTs. This is not complied with in practice. The study established that neither the WSMTs nor the DWSTs have initiated any action for the reconstitution of the WSMTs that have served the first four-year term. For instance, the current WSMTs in Gwollu and Daffiama were inaugurated in 2008. However, there was no performance assessment and reconstitution after the first term in office. It is not surprising that when a WSMT was asked of its composition (mostly the opening question during WSMT FGD) a member quickly said *"we do not have a Board"* (Excerpts from FGD, 12th March, 2014). According to this participant, what is expected from a functioning WSMT does not exist in the community. The participant explained that the responsibilities bestowed on them during the inauguration and their current practices are at variance. It was remarkable that a WSMT member acknowledged this. From the FGDs, it emerged that internal management wrangles (including financial misappropriation and usurpation of roles) have led to the weak composition and functioning of the WSMTs in these two communities. The WSMTs in Busa and Babile were

[41] For instance, in Gwollu, the WSMT (who had previous knowledge of the technical component of the water system) refused to accept the installation of the some components because they were inferior. The agitation resulted in a change of the components by the contractor. This somewhat justifies the logic in establishing the WSMTs prior to the construction.

inaugurated in May 2010 and their first tenure of office were to end in 2014. However, as at the end of the field work in July 2014, they had not started the process of reconstituting the WSMTs and they are likely to experience similar challenges (overstay in office) as happened in Gwollu and Daffiama. Table 7.3 shows the composition of the management staff during the inauguration and the time of the research.

Table 7.3 Management staff composition

Structures	Indicators	Babile	Busa	Gwollu	Daffiama
WSMT	Membership at inauguration	11	10	11	11
	Membership as at March 2014	5	8	Undefined[42]	3
Operating staff	Number of staff recruited	8	4	3	3
	Existing number of staff	8	4	3	3
Water vendors	Number vendors recruited	11	10	13	10
	Existing active vendors	6	10	13	1

Source: Field work, 2014

As shown in Table 7.3, the number of operating staff has not changed, although there are different compositions across the communities. However, there has been a decrease in the membership of the WSMTs in all the communities, signifying that WSMTs are not adhering to the position and boundary rules in Table 7.1, which requires the replacement of members who have exited. In Babile and Daffiama, the key informants and community members express worry over the future of the WSMT and the water systems, with the exit of the some key members of the Team. In both communities, the chairpersons died during their term of office and according to the informants (testified by some operating staff), the death of these people have affected the functioning of the WSMTs because they were able to mobilise the other team members to effectively monitor the activities of the operating staff and vendors. For instance, after the demise of the chairman in Babile, an operating staff remarked that *"once our chairman is dead, the Board is dead"* (Excerpts from interview, 16th December 2013). This is to emphasise that the chairman was the brain behind the success of the WSMT. The existing practices of the WSMTs justify the remarks of the operating staff. For instance, there is no strict monitoring of the operating staff and replacement of worn out parts of the water system has been slow.

Vendors: According to the WSMTs, the recruitment to the position of vending was made open to the general public. In principle, all prospective vendors were required to apply for the position, and be appointed after an interview. The criteria used in vetting applications and conducting interviews include: (i) good public relations; (ii) willingness and commitment to duty; (iii) literacy; and (iv)

[42] It is undefined because, at the time of the research, only the chairman was active within the WSMT. The rest of the members claimed to have been sidelined, and for over three years, there has not been any WSMT meeting neither do they know anything about the water systems. However, the chairman listed eight names as members of WSMT.

proximity of the applicant's residence to the stand-posts. Although willingness and commitment are subjective, the WSMTs and operating staff maintained that they are familiar with the community members and, as such, are able to identify those with these characteristics. However, literacy was never used as a criterion in Busa, and interestingly, all the ten vendors can neither read nor write. This was confirmed during the focus group discussion (FGD) with the vendors. The other communities stressed on literacy as a criterion in vending because they want the vendors to be able to read and record daily water consumption. In contrast, the discussion with vendors showed that some of them are not literate, and even some of the literates have no knowledge of water meter reading. Further discussion with the vendors revealed that the literates who could not read the meters did not go through the right entry procedures in vending, raising questions on compliance with procedures in CBWM.

The discussion with the vendors revealed that it was only in Babile and Busa that vendors submitted applications and were interviewed. In Daffiama and Gwollu, the vendors did not submit applications. They were either selected by the sectional heads, individual WSMT members or they inherited the vending position from relatives, sometimes without the knowledge of the WSMTs and the operating staff. The operating staff get to know of the replacement during revenue collection, when they notice different persons at the stand-posts. According to the operating staff and the WSMTs, this informal replacement of vendors has affected accountability for water revenue: debts incurred by predecessors could not be retrieved and the presence of social bonding constrains WSMTs from taking stringent measures (graduated sanctions) to retrieve the funds. Furthermore, such vendors have no training at all from the WSMTs or the operating staff. The training from their predecessors was limited to turning the stop cock for water to flow. Vendors who went through the right recruitment procedures were trained on meter reading (even though some are illiterates), measures to reduce water loss, cleanliness around the stand-posts, and good public relations.

Unlike the other communities, in Busa, although recruitment of vendors followed the procedures, the process had a historical root. During the inception phase, women representatives were selected to lead their fellow women in mobilising funds towards the community capital contribution. According to the WSMT, confirmed by the vendors and the household survey, women gathered stones and shea nuts to sell in order to raise funds for the capital cost. Upon completion of the project, the WSMT first sought the opinion of the general community about the sale of water. The men in the community perceive water vending as women's role and permitted women who were interested to apply for the positions. As a reward for sectional representatives who led the resource mobilisation process, those who were willing to serve as vendors were given priority. Interestingly, all the sectional representatives were interested in vending and submitted applications. These

applications were vetted and they were subsequently appointed. Remarkably, the vendors are still committed to their duties of selling water, as demonstrated in section 6.4.2 in vending performance.

Operating staff: As indicated in section 7.2, the operating staff are the employees of the WSMTs. In 2014, a project implementation manual was prepared by the CWSA and it specifies that a typical operating staff shall include: (i) a system manager; (ii) a technical operator who may double as the plumber; (iii) an accounts officer; (iv) a revenue collector; (v) security personnel; and (vi) vendors (CWSA, 2014d). The constitutions of the WSMTs are silent on the position and boundary rules for the operating staff. This has resulted in different composition (see Table 7.3 above) with redundant positions and overlapping responsibilities in some communities. This has had consequences on the overhead cost since the operating staff (excluding the vendors) are on salary, as established in section 6.3.1.

Although the operating staff are required (see boundary rules) to apply for their positions and be employed after an interview, there is an embedded transition in the recruitment process. During the construction phase, some individuals volunteered to work very closely with the contractors. These people were later employed as operating staff in their respective communities, amidst criticism from some community members. According to the operating staff, despite criticisms from some individuals about sectional representation[43] (although it is not a requirement) of operating staff, the staff argue that their employment was based on fairness and qualification. It is based on fairness because they volunteered to work with the contractor. An operating staff explained the process of recruiting staff in the following message:

> *"The beginning of everything is often difficult and involves sacrifice, but the end is sometimes joyous. During the construction, some sections were not so interested, and did not contribute much, especially in terms of labour, although they were to be paid wages. They did not also want to work with the contractor to study the nitty gritty of the work but some people volunteered and worked with the contractor. When they completed the project, there was a call for application to the position of operating staff and many applied. Based on initial efforts of some people, they were recruited after the interviews (Excerpts from interview, 31st January 2014).*

Similarly, in Busa, the WSMT explained that the elders of the community maintain that it is inappropriate for people who worked with the contractor to step aside for new members to be recruited as operating staff. During the FGD with the WSMT in Busa, a member said:

> *"Prior to the completion of the project, some members of the community toiled every day on a voluntary basis to see the completion of the project. It will be inhuman to ask those*

[43] For instance, in Babile, all the operating staff are Christians and no one from the Muslim section is part of the operating staff.

people to step aside for new set of people to constitute the management staff" (Excerpts from FGD, 7th December 2013).

The key informants in Gwollu and Babile also share similar views on initial sacrifices made by some individuals and there was the need to maintain them in management positions because they exhibited commitment to duty during the construction stage. The discussion with the DWSTs on the recruitment of operating staff revealed that this embedded process is to ensure that individuals who are eventually recruited as operating staff are committed to duty and have adequate knowledge of the technical components of the water systems. According to the operating staff, they have been working with the skills acquired during the construction. Apart from Daffiama and Babile, where the plumbers had technical education on plumbing prior to the current position, the rest do not have prior training on plumbing. In Babile and Busa, the accounts officers also had experience in accounting prior to their current positions. According to the WSMTs in Gwollu and Daffiama, they were able to sponsor the training of individuals who were expected to return and serve as accountants of the water systems. After the training, the accountants left the water systems position due to low remuneration. This was contained in the WSMT response to the audit query (see Appendix H). The challenge with the training approach is that, no contractual agreement was signed between the WSMTs and the trainees and, as a result, there was nothing binding them to stay after the training.

The other operating staff had no previous work experience or structured training in their respective positions. As such, those who had no previous training on plumbing had to work extensively with the contractor during the construction phase. While working with contractors is a cost saving mechanism and also gives would-be operating staff the opportunity to study the physical design and layout of the transmission and distribution lines, the staff indicated that a formal training upon completion would have enhanced their work. This is because the contractor was working according to schedule and there was little questioning during the field-based internship and, as such, an additional structured training would be beneficial. Nonetheless, the staff maintained that the approach was useful as they can visualise the layout and also caution residents of constructing and farming over pipelines.

In Daffiama, the operating staff indicated that in 2003 the District Capacity Building Project (DISCAP) sponsored a training of water management staff on report writing, plumbing and electrical works, water treatment, and financial management for all small town water systems' staff in the region. At that time the current management in Gwollu was not in charge and could not have attended, neither were the Busa and Babile water systems in place.

Exit and replacement of management staff: In terms of exit, some members of the WSMTs and the operating staff resigned without due process. The records available showed that it was only in Daffiama that one WSMT member resigned by tendering in a resignation letter. According to the WSMTs, the main reasons for the premature exit from the WSMTs include: (i) inability to adapt to social pressure (public derogatory remarks); (ii) transfers of public servants, who doubled as WSMTs, out of the community; and (iii) job dissatisfaction, that is, irregular WSMT meetings which made some members feel less relevant to the functioning of the water system. Staff who have exited their positions have not been replaced, leading to the decrease in the WSMT membership (see Table 7.3).

Therefore, there is no strict compliance with boundary (exit) rules of management staff. For example, some of the ex-officio members are within the public sector and they are expected to be replaced in the event of any transfer. Additionally, the Assembly persons are elected by the electorate for a four-year term subject to re-election or not. In the event that an Assembly person is not re-elected, the successor takes over as ex-officio member of the WSMT. It has been established that since the inauguration of the existing WSMTs, there have been changes in ex-officio members, notably the Assembly persons. However, none has been formally inducted into the WSMT and they do not work actively with the WSMTs. This is attributed to weak functioning of the executive committees, especially in Gwollu and Daffiama.

7.3.2 Choice and aggregate rules

As indicated in Table 7.2, the ex-officio members cannot hold executive positions within the WSMTs and in all the communities there is no ex-officio member within the executive committees. Apart from Busa's WSMT which still has active ex-officio members, the other three communities have defunct ex-officio members. As part of the choice rules, the DWSTs are also expected to conduct, at least, quarterly monitoring of the WSMTs' activities, and at the end of the financial year, carry out a financial audit. On the contrary, the study established that apart from Gwollu, where financial auditing was done in 2013 based on informal reports of suspicious financial misappropriation, the other three communities have not had any financial auditing over the past twelve months and there were equally no records on previous auditing, as at the time of the field work. This partially explains the financial mismanagement and lack of accountability to customers, as established in section 6.5.3. However, after the field work the outcome of the regional FGD led to audit of Busa and Babile WSMTs accounts.

As regard financial administration, the main regulatory legal instrument is the Financial Memorandum for MMDAs, and all public sector bodies, including the WSMTs, are required to

administer public funds in line with the provisions of the Memorandum. The Financial Memorandum for MMDAs (Part VIII, Section 13) requires that all payment vouchers be receipted or by a written acknowledgement in ink, on the payment voucher, by the payee when official receipt is not supplied. In contrast, the 2013 audit report of the WSMT revealed that some payment vouchers were without official receipts to properly acquit the payment voucher. The Memorandum (Part IX Section 10) requires that each payment be supported by a separate voucher except in the case of salaries or wages. However, various transactions were lumped into one payment voucher. The internal audit report attributed the lapses to lack of training on financial administration and/or lack of experience, laxity on the part of management staff to insist on official receipts when payment is made, and lack of supervision and monitoring on management activities by the regulators. While proper record keeping is the hub of any entity, it is limited in the management of the water systems. Therefore, payment without official receipts and lack of records on all transactions make it difficult to ascertain whether the expenditures were incurred in the interest of the water system.

Moreover, the WSMTs are constitutionally mandated to keep three accounts, namely: (i) operational/regular account; (ii) replacement/capital accounts; and (iii) sanitation account. The WSMTs are mandated to make at least weekly payment into the regular account to take care of all costs of operation and maintenance. The replacement/capital account, also known as the reserve account is expected to be used to finance major expansions and replacements of components of the water system. At least 20% of the net monthly water revenue, after the operational costs have been paid, is expected to be lodged in this account. This account has three signatories: the WSMT Chairman, the Secretary, and the Treasurer. The choice rules indicate that withdrawal from the reserve account can only be made with the approval and clearance from the District Assembly. In Gwollu, the reserve account has the District Coordinating Director, the District Finance Officer and the WSMT Chairman as signatories to enable the District Assembly *regulate* the operation of the reserve account.

All these measures are to ensure that WSMTs do not continuously withdraw money from this account arbitrarily. It was established that apart from Busa, the other WSMTs do not pay into the reserve account. In fact, Babile and Daffiama operate with only one account (regular account). They are able to evade this obligation due to weak and irregular financial monitoring. This gives them full control over the finances of the water systems. The sanitation account is reserved to help finance general sanitation and hygiene practices, including construction of latrines, and sometimes investment. The WSMT is expected to pay at least 10% of the net monthly revenue into the sanitation account, but the research established that none of the water systems has a

functional sanitation account, although Busa and Gwollu water systems do have a sanitation account.

Furthermore, appropriate financial administration requires that all revenue collected be paid to the treasury or bank in full, and any commission or salary to the collector shall be paid from an expenditure item. A review of the revenue and expenditures of the WSMTs showed that they failed to bank revenue before expending it on their activities, as also confirmed by the accounts in Babile and Busa. The WSMTs and the operating staff are well aware of this financial provision but simply do not often comply in all circumstances. Gwollu has a rural bank within the community, and the other communities have banks that are within 30 minutes reach by motorbike (the common means of transport) and, as such, access to banking services is not a constraint. Therefore, casual banking of revenue is attributed to lack of supervision on their activities and non-commitment to appropriate financial administration. The practice is contrary to the legal provision and the persons responsible can be surcharged, because the conduct can lead to conspiracy to divert public funds for private activities.

The vendors are required by rule to personally stay at the stand-posts during vending hours (mostly morning and evening), and this rule is completely adhered to in Busa and partially adhered to in the other communities. For instance, in Babile and Gwollu some vendors do release the keys to stand-posts to individual customers, especially those who need water in large quantities for construction or brewing of pito to fetch water. Since vendors are not at the stand-post to monitor the quantity fetched, it is possible that customers can deliberately fetch water and "under declare" the quantity fetched in order to pay less, resulting in revenue loss. Others also delegate children to operate the stand-posts while they carry out other duties elsewhere. In Gwollu and Babile, children were observed operating the stand-posts. These practices have often resulted in revenue loss as children cannot enforce some of the fetching rules over the elderly women who draw water at the stand-posts. For instance, according to the vendors, children are not able to prevent elderly women from using large basins to draw water. The practice of using large basins, which are above the recommended basins, leads to revenue loss.

Another major aggregate rule requires the WSMTs to set application procedures and connection fees for service connections. This is to minimise illegal connections and to promote transparency in private connections. In all the communities, there are similar procedures for private subscription to the water systems, as discussed in section 7.3.2.1.

7.3.2.1 Institutionalised private subscription process

Stage 1: Prospective customers are required to apply to the WSMTs indicating their intention to subscribe.

Stage 2: The customer is required to buy an application form and pay a connection fee. This varies from one community to the other. For instance, the connection fees are: GH¢100.00 in Babile and Busa, and GH¢109.00 in Daffiama. The household survey in Gwollu revealed that within a particular period, different connection fees were charged by the same WSMT. Private connection fees ranged from GH¢150.00 to GH¢ 350.00. There is no basis for the differences and according to the customers, the fees are arbitrary, and at the discretion of the WSMT. Some customers are not aware of this fee discrimination. This is the result of limited user-involvement in decision-making process and limited knowledge of customers on rules governing water management (see further analysis in section 7.3.4 below).

Stage 3: After paying the connection fee, the chairman of the WSMT instructs the plumber/operator to carry out feasibility studies on the site and submit a report on the suitability of the site for connection. This takes into consideration the house location in relation to the distribution point for private connection (DPPC). If the site is suitable for private connection, the plumber/operator will be required to prepare estimates, specifying the type and quantity of materials to be bought. In Babile and Gwollu, the applicant will either give the money to the plumber for the purchase of materials or personally buys them. The applicant bears the cost of trenching for pipe laying. In contrast, in Daffiama, the WSMT indicated that after paying the connection fee, the WSMT bears the cost of meters (approved meters from CWSA), stop cock, and labour for trenching. This is to ensure that the appropriate materials are supplied, and to enable the operating staff supervise the trenching to meet the required depth. Although in principle this is a good quality assurance strategy, the household survey revealed that customers bought the stop cock and paid the cost of labour for trenching. Additionally, they paid a token (to facilitate the process) for the estimation of material and connection. According to some respondents, where a customer paid the cost of materials (estimated) to the operating staff, connection is done faster than when the customer purchases the materials. This implies that there are benefits to gain from purchasing materials for the customers.

Stage 4: The last stage entails connection and inspection. After the connection, the chairman of the WSMT and/or the system manager goes to inspect the connection, and again brief the subscriber of his/her obligations.

The essence of such a well-structured process is to ensure that all the private connections are known to the operating staff and the WSMT. Any private connection that does not pass through these stages constitutes an illegal connection. Judging from this condition, then many private connections are illegal, because in reality, this process has been truncated. The FGD with the management staff revealed that there are instances where prospective subscribers purchased the materials before stage one. Such people, in a bid to hasten the process of getting connected, will usually consult existing subscribers for guidance on the type and quantity of materials that were used in their cases. This is irrespective of the differences in distance from the DPPC to the house of the prospective customer. Management staff argued that non-compliance with procedures has resulted in subscribers buying inferior and/or inappropriate materials, and the affected persons were unwilling to buy another set of materials. This compels the plumber/operator to carry out alteration of the purchased materials, especially when the prospective customers are closed allies of the some water managers. This practice also raises questions on the firmness of water managers to work with the rules.

In principle, all the communities have similar procedures for private subscription, although the process has not been documented for purposes of institutional memoire. While there is a well-structured process, the management staff are unable to remain firm to enforce it. This is caused by the presence of social bonding, which makes it difficult for management staff to enforce decisions, and secondly, by the desire for personal gains. During the interviews, some key informants, confirmed by some management staff, revealed that management as a collective body is not able to enforce compliance to the private subscription process because some of them are guilty of violating the process. One key informant fervently indicated that the management do not have the moral authority to enforce the procedures because there were bad precedents set by some key management staff. Some management staff violated the process to connect households and they diverted the money for private use. This is the adverse effect of dominant leadership in which leaders use the powers vested in them to engage in illegitimate activities, thus perpetuating non-compliance.

7.3.3 Information, pay-off and scoping rules

Table 7.2 shows that the information rules provide a comprehensive quality assurance for information generation and sharing. Although there were no documented reports from the operating staff to the WSMTs, their close contact suggests that WSMTs are knowledgeable of the water status. However, that is not a substitute for the monthly reports. It was also established that WSMTs do not report to the DWSTs, and DWSTs, on the other hand, do not often monitor the functioning of the WSMTs. The regional level FGD validates the findings at the community and

District Assembly levels on information sharing across the two levels: there is no enforcement of this basic rule (reporting requirement).

A participant (during the Regional FGD) used an adage to sum the discussion on information rules, further justifying the non-compliance of the rule, in the following message: *"you only hear the sound of a gun when there is an animal in the forest"* (Excerpts from Regional FGD, 8th July 2014). This implies that when the District Assemblies (DWSTs) do not receive reports on the water systems, it suggests that there is no problem with the water systems. Thus, any time there is a fault, the DWSTs would receive reports from the WSMTs. It also implies that the WSMTs are aware of this requirement (reporting) and simply fail to comply. The reporting gap between the two levels is also due to delay in honouring regulatory obligations. The discussion revealed that there were reported cases to the DWSTs and no actions were taken. Consequently, the WSMTs have devised new strategies of adjusting to the DWSTs delays in responding to the WSMTs' concerns, especially major repairs of the water systems.

The WSMTs have arranged with mechanics (without passing through the DWSTs), to attend to the water systems during breakdown. This strategy has been successful as indicated by the WSMTs. During the Regional FGD, a participant indicated vehemently, the rationale behind this adaptation strategy. He said:

> *"We have had a lot of challenges before our water system became okay for us. Whenever there is a fault and it is reported to the Assembly, it looks as if you are reporting to nothing or nobody, with all apologies! If you have an emergency/problem now and you report to the District Assembly, it will take you more than a week before you see the Assembly people". A second participant* interrupted, "a year[44]!" *(Excerpts from Regional FGD, 8th July, 2014).*

The basis of dealing directly with mechanics is that the water systems are the prime sources for the majority of residents and long downtime implies denying community members of water. Hence, this strategy is to avoid long downtime of the water systems. They further argue that, the role of the DWSTs is to link them to the area mechanics and given that they are shirking that simple responsibility, it was necessary for the WSMTs to carry it out. This strategy, although it works well, has further weakened information sharing between the WSMTs and the DWSTs.

Beyond the existing fragile information sharing between the operational and regulatory levels, there exists weak information sharing between the WSMTs and customers. Although the WSMTs are knowledgeable of their obligation to keep customers well informed of the functioning of the water system, it is seldom done in all the communities. Just as the WSMTs report to the regulatory levels *only* when there is a problem, the customers also indicated that the WSMTs engage with

[44] This is to emphasis that the District Assemblies do not respond timely and that the one week mentioned is even charitable.

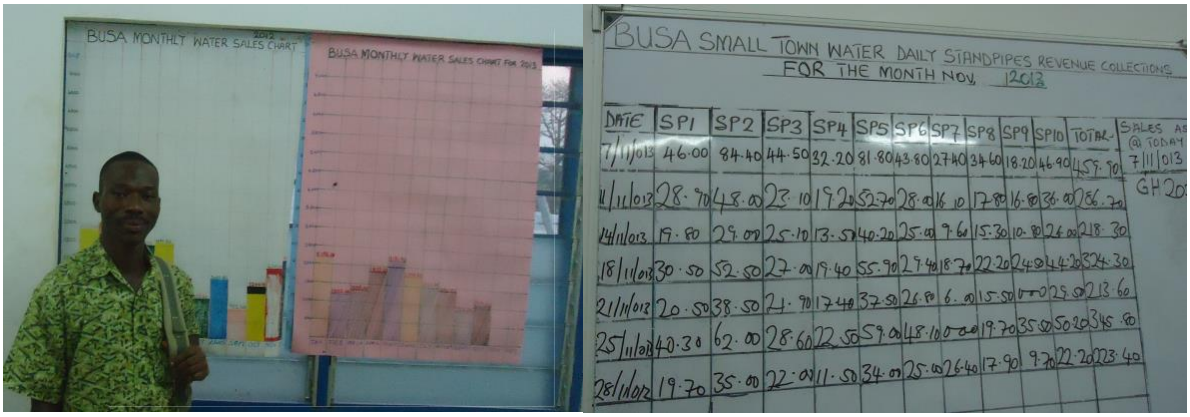
them (customers) only when there is a problem. For instance, a woman in Daffiama described the situation as follows:

> *"Honestly, any time you hear that there is a meeting about the water system, just know that there is a 'funeral' with water management[45]. Either there is a fault and they need money to repair, they are quarreling among themselves over accountability issues, or VRA is threatening to disconnect the power for non-payment of electricity bills ..." (Excerpts from Discussion, 12th March, 2014).*

This means that information sharing is also weak within communities, and it suggests that stakeholders tag information sharing to reporting about challenges with the water management or responding to challenges. Instead, information sharing should not be limited to negative feedback. Feedback can be positive or negative and, as such, even where there are no managerial problems, it is important to report on how the management staff are maintaining the functioning of the water systems.

The constitutions of the WSMTs provide that information about the water systems, especially revenue and expenditure pattern, be displayed on public notice boards. It was only in Busa that monthly revenue is displayed on the notice boards in the office of the WSMT. Some of the statistics are presented in bar charts (see Figure 7.2). There is no information on the notice boards about the expenditure of the water systems. That notwithstanding, it is an improvement over the other communities in terms of information sharing and for that matter transparency about the water revenue.

Figure 7.2 Busa revenue statistics displayed on office notice boards



Source: Field work, 2014

In terms of pay-off rules, the reward systems as outline in Table 7.2 are adhered to. However, sanctions are barely delivered when they are required. Apart from Babile where some management staff were suspended for alleged misconduct, there are no stringent penalties for

[45] This simply means that WSMT or operating staff will never call for a general meeting or private subscribers meeting unless there is a problem with the water system which they need funds to rectify.

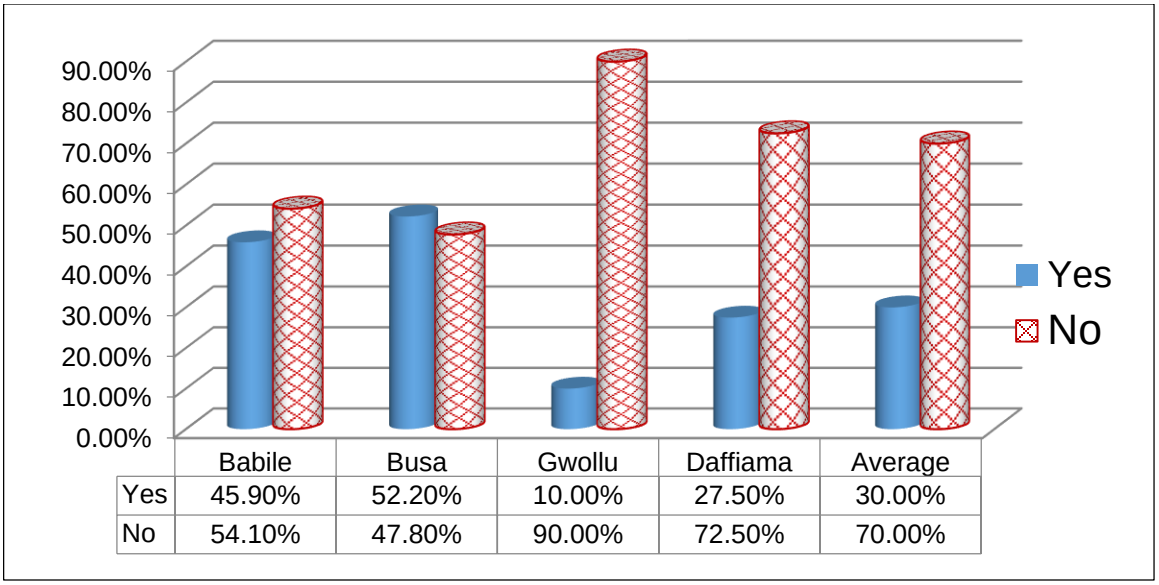
persons, either some customers or management staff, who violate any of the rules. For example, government departments and staff who default payment of water bills are not disconnected while households who default payment are disconnected (discussed earlier in chapter six, section 6.3.2). There were equally no executed penalties for collective violation of rules. For instance, in the event that the WSMT, operating staff or DWST fails to comply with any rule, there are no penalties. In Gwollu and Daffiama, there were reported cases (from the household survey and FGD) of staff misconduct, including financial misappropriation. However, there were no sanctions on the affected persons, neither were the funds completely retrieved. It can be argued, based on the evidence, that lack of enforceable penalty leads to breaking of rules and fraudulent activities in CBWM.

In terms of scope rules, although the water was provided basically for domestic purpose, the customers use it for commercial activities. Hence, as shown in Table 7.2, there is no limit to the quantity of water one can withdraw, as long as the water is available and the individual is able to pay for the quantity. There is also no limit to the purpose to which the water is used, explaining the use of water for construction and other commercial activities (see section 6.2.1). In two of the communities, different uses of water attract different tariffs, while one community (Daffiama) used a uniform rate for all categories of uses, as demonstrated in chapter six.

7.3.4 Households' knowledge and perception of CBWM rules

Although many of the rules are directly related to the management structures, it was important to examine the households' knowledge of these rules, as some of the rules make provisions for integration of customers in decision-making and information sharing, yet analyses show that the actors are not adhering to the rules. Moreover, as demonstrated in chapter four (section 4.3.1), customers' knowledge of rules is necessary for adherence, as customers can help enforce rules. Therefore, beyond an analysis of how the rules are applied, this section also examines the households' knowledge of the rules (see Figure 7.3).

Figure 7.3 Households' knowledge of CBWM rules



	Babile	Busa	Gwollu	Daffiama	Average
Yes	45.90%	52.20%	10.00%	27.50%	30.00%
No	54.10%	47.80%	90.00%	72.50%	70.00%

Source: Field work, 2014

As indicated in Figure 7.3, only 30% of the respondents have knowledge of CBWM rules. Knowledge of rules is relatively high in Busa and Babile and low in Daffiama and Gwollu. This is confirmed by the statistical analysis which shows that households' knowledge of rules differed significantly, $F(3, 146) = 7.275$, $P = 0.000$, between communities. A cross tabulation of household knowledge and gender showed that 68.9% of those who are knowledgeable of water management rules are females while the remaining 31.1% are males. Thus, knowledge of rules is higher among women than their male counterparts.

Households who indicated that they had knowledge of the CBWM rules were required to mention them. It was found that all those who had knowledge of rules mentioned community specific bye-laws/rules that were developed by the WSMT and operating staff. These are fetching rules (such as pay-as-you fetch, do not wear sandals on the stand-posts pad, and no washing of basins/containers at the stand-posts), explaining the high knowledge among women, since women are directly in charge of water fetching and these rules directly affect them. According to the household respondents and the operating staff, the essence of these rules is to minimise water loss, and also ensure hygienic practices at the stand-posts. Household members are not happy with some of the rules, especially those that prohibit washing of basins/containers at the stand-posts because there are instances where there is no water at home to wash the basins before going to the stand-posts. Notwithstanding the limited knowledge of boundary rules, some households were of the opinion that management staff should be changed, at most, every five years in order to minimise corrupt practices. This suggests that if community members were fully knowledgeable of CBWM rules, especially boundary rules, they could lead the process of

enforcing them. Thus, the effect of limited knowledge of rules is that WSMT members outstay their positions in office.

The household survey shows that there is a significant gender dimension of knowledge of CBWM rules: women are more knowledgeable of rules, although their knowledge is limited to “fetching rules”. The rules make provision for women’s integration into CBWM. As such, it is important to examine the gender dimension of CBWM.

7.3.5 Gender dimension of CBWM: the existing situation

For emphasis, the position rules require that 40% of the WSMT composition should be reserved for women. The WSMT constitution of Daffiama specifically requires that each section presents a male and a female representative to constitute the WSMT. The essence of these provisions is to ensure that women’s views on water management are carried across.

Despite these legal provisions and the potential benefit of a gender-balanced CBWM, the study established that women were not actively represented in water management. Apart from Busa, where there are two women on the WSMT, representing 25% of the WSMT membership, the remaining three communities do not have women actively on the WSMT, although on record there are women within the WSMTs. The gender dimension of the operating staff is not so different from the WSMT. In Babile, apart from the Accountant and the Revenue Collector who are females, the rest of the operating staff are men. In Busa, Daffiama and Gwollu all the operating staff are men. There is however no rule violation because the rule that sets up the operating staff composition does not specify the gender composition. These positions are simply based on qualification and interest of the individuals. That notwithstanding, the fact that women are the household water managers makes it imperative to have them at the hub of CBWM. For instance, as established in chapter six (section 6.3.3), women take up payment of water bills while the men are responsible for electricity bills. Although this study did not delve into electricity bills, there were instances where water bills exceeded electricity bills. That is, in households where the receipts of electricity bills and water bills were made available, in all instances, the water bills were higher than the electricity bills. In such instances, women bear the greatest burden of utility bills. Therefore, while women are almost absent in CBWM, they are generally managers and financiers of water services at the household level.

Nonetheless, it was observed that there was the tendency of women to present a balanced role. For example, the gender dimension in water delivery was asked during a discussion with a female group. Some women made attempts to present a balanced picture of men and women’s

involvement, perhaps to shield the men, but a member of the group openly interrupted with the following message:

> *"Are you afraid to tell the truth? If a woman can even farm and cook for the man (husband) in the house to eat, now you expect him to connect water to the house and pay water bill for you (woman)? Sit there and wait, he would not mind you. Does he care or does he fear the wife?" (Excerpts from Group Discussion, 12th March, 2014).*

According to this woman, there is no need to shield the men to outsiders (the Researcher) because some women are responsible for the upkeep of their households. For her, if a woman can farm and feed the husband and the children, then one should not expect such a man (irresponsible in her view) to connect water to the house. This suggests that some men do not simply care about how women access water for the household.

Interestingly, while the women pay for connecting water to the house and also pay the water bills, the man's name is used to process the application and the bills come in the name of the man. The women explained that they (women) moved from their parents' house to settle with the man, yet the woman pays the bills. As such, using the man's name is a sign of respect for him and to recognise him as the household head. Some women however used their names for the subscription. This is common in some Muslim households with private connections. According to the operating staff, the main reason is that some Muslim households are polygamous, and in such households, women subscribers prefer to use their names in order to control the usage of the indoor taps[46]. This was established by the operating staff during the application process.

Similar views on gender dimension of water management were expressed in Babile. The stand-post in a section of Babile has been locked for more than a year. According to the management (operating staff and vendor), there is no demand for water from the stand-post in that section. It was worth exploring the rationale behind the lack of demand for water within that section. In contrast, during a discussion with women of the section and the vendor, differential pricing within the same community was the reason for non-patronage of water from that stand-post (the details on differential pricing of water was discussed in section 6.3.3). Delving into the role of men (their husbands) in solving the situation, the women indicated that complaints were lodged with the men but they have not responded. An elderly woman in the group added:

> *"We are concerned about ourselves. My son knows it all, yet he asked. Do men bother when it comes to water? They only want to return home to get water to bath. Whatever the women will do to ensure availability of water at home does not concern the men" (Excerpts from Group Discussion, 12th December 2013).*

[46] A woman in many polygamous house manages her house keeping arrangement for the benefit of her husband and children. Domestic water management is one of these house chore arrangements. Therefore, a woman, mostly the financially sound, who acquires an indoor tap in her name would have control over the use of the tap. Although such women do not arbitrarily prevent house members from drawing water, they have a greater say in the setting of rules and general arrangements of the indoor tap.

This woman thinks that the Researcher should have known that men are less concerned about water and, therefore, need not asked that question. In the research sites, it is sometimes difficult to hold separate discussion with married women without the consent of their husbands. With this knowledge the consent of men in the same section were sought before the FGD and after the discussion the men were briefed. The men (seven in number) also confirmed the differential prices raised by the women. Despite the duration of the challenge, the men were yet to make a follow up. This confirms the assertion by the women that, men are less concerned about water issues in their section.

Despite the central role of women in domestic water services, the composition of the management structures (see section 7.2.1) in all the communities show that men control the management of water systems. The level of control is also reflected in community meetings which were held. For example, in one community there were meetings between management staff and subscribers over non-payment of bills. The group discussion with women, and confirmed by the WSMT, indicates that during such meetings, women constituted over 70% of the participants. This is because they are mostly responsible for the indoor taps and the stand-posts. The women revealed that their voices are hardly heard during meetings. A member continued:

> *"If you want to raise an issue and the management staff know vividly that they are at fault on that issue, they will cover it up with another topic and that issue may never be revisited. Barbe barbe na, kon ban sonte[47]" (Excerpts from Informal Group Discussion, 12th March, 2014).*

While the women think that management staff simply do not want to listen to their (women) concerns on CBWM, the management staff argue that the meetings have an agenda and, as much as possible, they steer affairs of the meeting according to the agenda. Hence, they suggest that some concerns of the customers be addressed in subsequent meetings. Although the management staff gave different explanation for the adjournment of concerns during meetings, it remains significant that concerns which require clarification are often adjourned. This does not promote transparency in water management. Moreover, with the absence of frequent meetings, there may never be an opportunity for such issues to be raised and addressed.

Therefore, despite the legal provisions for female involvement in CBWM and the fact that women are the main household managers of water, they are not well integrated into CBWM. The absence of a user-WSMT meeting has further widened the gap in information sharing between the customers and the management staff, although women want their concerns to be heard and addressed. A key function of the regulatory level is to monitor and coordinate the activities at the

[47] Leave that issue for now, leave that issue for now!!! These statements will not help us.

operational levels. The institutional arrangements make provisions for the regulatory level to monitor and ensure that customers are well integrated into CBWM and that customers' concerns are addressed. The above discussion on CBWM rules enforcement raises questions on the role of the regulatory level.

7.4 Oversight responsibility in water services delivery

The analysis of the institutional arrangements in section 7.2 shows that the regulatory level has an oversight responsibility in CBWM. The essence of this section is to analyse the composition and functions of the regulatory level, particularly the DWSTs, as regards their legal mandate in CBWM. Specifically, the section is structured as follows: the composition of DWSTs, funding of DWSTs' activities, monitoring functions, and coordination functions.

Composition: As at the time of the research, all the DWSTs claimed they were in the process of reconstitution. This could not be ascertained because there was no evidence, such as meetings held as part of the reconstitution process. Although the Researcher was able to hold discussion with the Units' representatives who (expectedly) constitute the DWST, in practice, they have not been working as a team partly because some of the Unit members had just been transferred to the Districts. Hence, some of them are new staff and do not know much about the detail functioning of the water systems being considered in this study. According to the DWST members, frequent transfer of Local Government staff including DWSTs members amidst poor transition of functions, is partially responsible for the weak functioning of DWSTs. All the members of the DWSTs are core staff of different units within the District Assemblies and this makes water and sanitation-related activities subsidiary. Hence, contrary to other social services within the district, there is no separate unit that is solely responsible for water. The water sector is subsumed under the social works department and this has had implications on funding monitoring of water activities.

Funding: In terms of funding, there is no separate budget for the activities of the DWSTs, except where new water and sanitation facilities are to be provided. In situations where new projects are to be implemented, the projects come with their own budget and the DWSTs have a strong stake in the budget, especially for monitoring. For completed water projects, when there is a DWST activity, a budget is submitted to the District Central Administration for vetting, approval and release of resources. The challenge with this approach is that most often the approving authorities are reluctant in approving budgets, especially for monitoring of completed projects, attributing it to lack of funds for monitoring. They further indicated that in some cases, the approving authorities are not available (sometimes, away on other duties). However, non-availability of approving

authority should not be a constraint if proper planning for quarterly monitoring is done well ahead of time.

It is required that monitoring activities be part of the annual actions plans of the District Medium Term Development Plans (DMTDPs). A review of the current DMTDPs shows that the focus in the water sector is on provision of new facilities. However, the DMTDPs have identified poor management of water facilities as challenges and there should have been provisions within the DMTDPs to overcome such challenges. Out of the four DMTDPs reviewed, it was only Wa Municipal plan that has interventions targeted at creating a database for water and sanitation and rehabilitation of the broken down water facilities (see SWDA, 2014, LDA, 2014, WMA, 2014, DBIDA, 2014). The absence of monitoring of completed projects in the DMTDPs reaffirms that less attention is given to monitoring of completed projects.

Thus, there is strong commitment by the District Assemblies (DAs) to acquire new projects but the same commitment hardly exists to promote their sustenance. There are implicit reasons. Donors either financially support new project implementation monitoring or require the DAs to financially support it as their counterpart funding. Whatever the case, there is an incentive to the staff of the DAs and, as such, they are often committed to the process. Therefore, prior to the commencement of the water project, the necessary institutional arrangements are put in place, including funding, and enforced to ensure a smooth implementation. For example, during a power point presentation at the launch of new water projects, it was observed that there are strong and well-coordinated committees at the regional and district levels to carry out monitoring to ensure timely completion. Resources have been committed to the entire process of the project implementation. However, upon completion similar arrangements exist in principle (in documents) but their enforcement is virtually absent. These have affected the monitoring functions of the DWSTs.

Monitoring and coordination: A key function of the DWSTs is to monitor the operation of the WSMTs and provide technical support as and when necessary. The discussions with the DWSTs revealed that in principle, the monitoring function is structured to take care of all components of the water systems. Typical monitoring activities include: (i) review of financial administration; (ii) inspection of leakages along transmission and distribution lines, status of the pump house and fittings; (iii) examination of stand-posts and records on HLT cleaning; and (iv) review of documentation on user-WSMTs/operating staff meetings, community level decisions taken and their implementation. After monitoring these areas, the DWST then meets with the WSMT/operating staff to discuss their findings and the way forward.

Based on the activities of the WSMTs and operating staff, the monitoring framework is appropriate for the functioning of water systems. However, the DWSTs barely adhere to the framework. For the past year, there has not been any structured monitoring of the activities of any of the WSMTs. According to the DWSTs, visits to communities are done on ad hoc basis notwithstanding the quarterly mandated monitoring. During the discussion on the impact of lack of DWSTs monitoring on WSMTs activities and the functioning of the water systems, a member said:

> *"There are no user-WSMT meetings and no conformity to institutional arrangements for CBWM because we (DWSTs) do not monitor their activities. We do not also monitor because of the District Assembly bureaucracy" (Excerpts from FGD, 6th May, 2014).*

The bureaucracy relates to the release of resources for monitoring, as discussed above.

This is worsened by poor working relationship and weak information dissemination within the District Assembly, which affect their activities, including their obligation to CBWM. These are the words of a DWST member about internal management issues at the District Assembly:

> *"You see!! Things fall apart.* There are internal management problems. *Those good days, things were running smoothly because there were lots of interactions. We used to have top management meetings, sectional heads' meetings and then workers durbars. With these interactions, concerns were raised and addressed and the benefits were felt at the communities, the grassroots. Today, it is the opposite. There are no sectional heads meetings, not to talk of workers durbar, for concerns to be raised and addressed. As a result, you go to the drinking bars, the markets and hear workers complaining, because there is no avenue for them to channel their concerns. It is only the topmost that hold management meetings, and they have ignored those who work for them to manage. The concerns of those at the bottom, the actual workforce, are not heard. In fact, many of the young ones who are zealous to work are frustrated by top management behaviours…" (Excerpts from FGD, 30th April 2014).*

From the above message, it is evident that the chain of communication has been compromised and the management have created a power distance among top personnel at the DAs, the middle and the lower levels personnel. This confirms the statement of the DWST member about the DA bureaucracies, which affects the activities of the DWSTs.

Beyond the bureaucracy at the District levels, there are coordination challenges among the regulators (the District Assembly and the CWSA). Discussion with the regional CWSA revealed that there are equally role differences and institutional gaps in coordinating water management. The CWSA's facilitative role has limitations. The DWST, which is expected to be working directly with the CWSA, is responsive to the District Administration. Thus, the CWSA is constrained in enforcing certain decisions and legislative requirements in water development. For instance, apart from Gwollu WSMT that was audited in January 2013, the rest of the WSMTs have not been audited within the year. But CWSA is constrained in enforcing this requirement. The District

Administration is capable of enforcing this because the DWSTs are directly under it. The District Administration is not enforcing this requirement partly due to limited funds, as they indicated, and this has affected commitment to monitoring of completed projects.

Therefore, institutional arrangements that define CBWM and the existing management practices pursued in the small towns are not in conformity. This greatly explains the current state of the water systems' performance as analysed in chapter six. Additionally, the lapses in CBWM are further triggered by certain drivers. Therefore, given the existing practices and status of water systems, it is important to analyse how these drivers (see section 7.5 below) impact on CBWM and the extent to which actors are adapting to them.

7.5 Drivers effecting the small town water systems

As demonstrated in the analytical framework (component C of Figure 4.3), there are drivers that affect the water systems, and the ability of the actors to adapt to these drivers will influence performance outcomes. This section analyses the empirical drivers based on the four CBWM cases, which have been categorised into: (i) demographic changes and increased demand; (ii) socio-institutional dynamics and increased accountability; (iii) political factors; and (iv) work environment and lack of response to technological changes.

7.5.1 Demographic changes and increased demand

As the population increases, the existing production capacity of the water systems will certainly not be able to match demand, and there will be a need to prepare towards expansion of the water systems. As indicated by the WSMT in Gwollu, increase in demand for water often puts pressure on components of the water systems, such as the submersible pump. For example, in Gwollu, there was a breakdown in 2004. Due to increase in population, the capacity of the reservoir ($45m^3$) at the time could not meet the water demand. The operators are compelled to pump water directly through the distribution lines, thus putting stress on the pump, and this caused a breakdown of the submersible pump. This was repeated in 2014 when another submersible pump broke down. As a response to existing or anticipated major replacements, the constitutions of the WSMTs require WSMTs to maintain a functional replacement/reserve account. As established in section 7.3.2, besides Busa, the other communities have no functional replacement account. This means that there is no provision for major replacements of the water systems.

The WSMT indicated that given the current inflows and outflows, they do not have the financial capacity to expand the major components (build new HLTs and/or drill and mechanise new boreholes) to adapt to potential increase in water demand. There are also no plans within the

medium term development plans of the respective districts to carry out any expansion of the water systems. According to the DWSTs, the water systems are relatively new or have had recent major expansion and rehabilitation. Nonetheless, it implies that with increasing demand, there will be pressure on the existing water system, exposing them to breakdown. According to the operating staff, the current strategy during semi-breakdowns, especially breakdown of one pump, is to ration water to consumers. This also compels households to devise adaptation strategies, such as limiting water usage, negotiation with neighbours who have HDWs, and payment of sectional borehole fee to gain access right. The households and the management staff indicated that the challenge with this strategy is the inability of operating staff to develop and communicate a water rationing plan to the customers during breakdown.

Another adaptation strategy to population changes is the preparation of a comprehensive facility management and expansion plan (strategic planning). The plan is expected to stipulate the existing water demand and project the future demand. This gives a holistic view of expansion needs of the water systems. Although the actors (during regional level FGD) are knowledgeable of this major requirement, none of the WSMTs has a management plan and there have not been any actions from the regulatory level to ensure that these plans are available and functional. Interestingly, Busa, Daffiama and Babile have intentions to expand water coverage to satellite communities, although there are no plans to increase production capacity. This intention, if implemented, will further put pressure on the existing production capacity. Besides the demographic changes, there are socio-institutional factors that the water systems need to adapt to in order to remain functional.

7.5.2 Socio-institutional dynamics and increased accountability

The existing social structures of the communities influence the operation of CBWM. The tenets of CBWM require WSMTs (some of whom are elders of the communities) to render accounts of their stewardship or where they fail to do, citizens can demand accountability from them. However, differential power structures, social bonding and the culture (norms/customs) of the communities constrain some community members from seeking accountability from elders and sometimes relatives. The nature of social bonding, which are deepened by the norms and customs of these communities, gives what can be termed as socio-institutional immunity to people who are directly involved in CBWM. That is, management staff, who are elderly persons, are insulated by the cultures of the areas and societal bonding. This creates an opportunity for them to violate some of the management rules to their own advantage.

Some community members complained about previous conduct of some current management members, which they identified as inappropriate for the sustenance of public resources. Paradoxically, those people were selected by sectional heads/elders to represent their sections in WSMTs, but a household respondent sums it up in the following message: *"in Ghana[48], when someone kills a fellow human being and everybody knows it, he (culprit) will still have people to support him or defend him" (Excerpts from HHS, 1st March, 2014).* It means that at the community levels, due to social bonding, individual weaknesses are sometimes shielded and public resources are entrusted to them for management. Naturally, they are still imbued with those weaknesses and the resource will have to be managed under such weaknesses.

Social bonding [the within sub-groups (families and clans) ties] seeks to create affection and reliance for members of the group and this relationship has been extended to water management. As a result, bonding within the families and clans tends to create favouritism for members at the expense of collective action for the mutual benefit of all community members. For example, during a focus group discussion, an operating staff said:

> *"As a native, sometimes it is difficult to work with one's community members, especially in a sensitive sector such as water. Is it possible, as a system staff, to disconnect a relative or a community chief's water supply because of non-payment, although there are laws on disconnection of defaulters? If one dares, one would be perceived as disrespectful and there may be consequences (Excerpts from FGD: 27th January 2014).*

Although social bonding is expected to serve as a source of uniting community members to engage in CBWM, it can create unhealthy preferential treatment of members of the group (family or clan) to the detriment of CBWM. According to a WSMT chairman, an operating staff, who doubles as his clan member, was suspended for misconduct. The suspended staff's elder sister confronted and verbally assaulted the chairman, accusing him (chairman) of being wicked towards a clan member. In other words, the chairman was not perceived as executing a legitimate function in water management but breaking the *bonding* that exists within the clan. Hence, although social bonding can foster local values and customs, it can serve as a source of discrimination in CBWM.

Moreover, when members within the sub-group anticipate preferential treatment from their associates in management positions, it becomes difficult to enforce the institutional arrangements for CBWM. In such situations, higher level actors, such as the regulatory levels, can step in to resolve the socially embedded conflict. However, non-compliance to the institutional arrangements for monitoring and supervision, especially by the regulatory level actors, has

[48] Implying, in today's world.

deepened the socially embedded conflict. Therefore, the downside of social bonding, which is exacerbated by non-participatory decision-making, has generated tensions within water management in the communities.

Tensions with water management: At the management level, there are conflicts related to water management. For emphasis, the major sources of conflict are usurpation of roles, limited collective decision and actions, and miscommunication. Usurpation of roles is common with plumbing works, especially new connections and in some cases (Gwollu, Babile and Daffiama) revenue collection. In these communities, it was established that there were instances where the plumbers/operators were at post and the other superior management staff executed plumbing works (private making connections) without following the institutionalised procedures in section 7.3.2.1. The non-compliance is due to the associated gratuity from the customers. The desire for personal gains resulted in takeover of roles and this has consequently affected team work within management staff.

Additionally, the mode of communicating collective decisions and actions to community members has affected synergy within management staff. Decisions that are taken at the management level sometimes require a designated officer to execute them. According to the operating staff, community members construe collective decisions and actions as individual action. This often results in conflict between affected officers and the consumers. For instance, in one community, management took a decision to disconnect a customer for default payment, and an officer was designated to execute the decision. The defaulter confronted the officer assigned to carry out the disconnection and further reported the matter to some WSMT members. This is the story of the officer:

> *"Sometimes the actions of some members, especially in the Board, can be discouraging. There was a time that a private subscriber was issued with the monthly bill and she complained and swore never to pay that huge amount of money, and actually did not pay... It was decided that the tap be disconnected and I was tasked to execute it. The woman went to some Board members to complain about the disconnection that I did. Sadly enough, they told her that they (Board) will meet me on the issue. You see!! This suggests that I disconnected the woman's tap and not that it was a management decision to disconnect her tap. Up to date, the woman does not greet me. There was another customer who was in debt for three months and the Board asked me to disconnect her tap, and I told the Board that this will not happen again. If the woman is even in debt for one year, I will not disconnect the tap" (Excerpts from Interview 7th January 2014).*

According to the affected individual operating staff, the WSMT as a collective body has not been supportive in exonerating them (operating staff) of public offensive comments. In another

community, a WSMT-operating staff joint decision was taken to disconnect a customer for non-payment of an accumulated water bill. Prior the execution of the decision, the WSMT held a separate meeting with the customer and the decision was rescinded without the operating staff's knowledge. These actions, according to operation staff, have affected their enthusiasm in executing some of their functions. The operating staff indicated that those who are required to support in enforcing decisions rather thwart their successful implementation. This affects revenue mobilisation and team work.

Besides the challenges in collective decisions and actions, the mode of disseminating water-related information to the general public is important in creating harmony within CBWM. This is because personalisation of public notices/announcement has often attracted derogatory remarks from public to the affected persons. For instance, according to a secretary of a WSMT, public announcement on issues such as disconnection and other adverse water-related practices are made in churches and mosques. Instead of reporting it as sent by the management of the water system, it is reported as coming from an individual, for example, the secretary. This has affected the relationship between the affected staff and the customers. While these internal tensions and lack of cohesion may appear trivial, they build up and the combined effect is that the ability of internal management structures to mobilise and team up, in the event of a water problem, is constrained. That is, the repercussion on the enthusiasm of management staff is significant because each will want to win public favours to the detriment of their core responsibilities. On the other hand, such misconceptions could have been avoided if there were customer-WSMT engagement as outlined in the institutional arrangements.

Beyond management levels, tensions between sections have also crept into water management, especially in Gwollu. In Gwollu, differences between two sections affected an initiative adopted by management on revenue collection. The WSMT negotiated with the two operators to double as revenue collectors till a time that the water system is well resourced to employ a revenue collector. This was a cost saving strategy and it was successfully implemented until the Assembly person in one section intercepted one of the revenue collectors and instructed them not to collect revenue within his electoral area. According to the operators, he indicated that:

> *"You are not the only literates in this community. Allow other people to collect the revenue and also earn something for a living. If you want to collect revenue, do so in the other section and not within my section" (Excerpts from FGD, 27th February 2014).*

The focus group discussion with the operating staff shows that the WSMT did not take any action and consequently the operators relinquished the function of revenue collection. This compelled two WSMT staff to take up the revenue collection function and that has been the practice. This was also the beginning of revenue loss, caused by mismanagement and inefficient revenue

collection, as identified by the audit report. According to the CBWM rules (see Table 7.2), the Assembly persons are ex-officio members of the WSMT, implying that if the WSMT was working according to the CBWM rules, the Assembly person would have been part of the decision to use the operators as revenue collectors. Therefore, a lack of collective decisions and actions partly led to the conflict.

Similarly, in Busa, there were internal tensions within the traditional authority and some individuals within the traditional authority factions are part of the WSMT. Remarkably, the management staff resolved to put aside the differences within the traditional authority and direct their efforts and attention to the water management. A review of the WSMT minutes, confirmed by a key informant interview, showed that during a visit of the National CWSA to the community, the WSMT took a firm decision not to introduce the traditional authority to the dignitary at the meeting. This strategy was to avoid the WSMT being perceived as mingling with traditional authority issues, which can have serious repercussions on the functioning of the WSMT. This resolution was successfully executed. Therefore, the ability of the WSMT to block internal community non-water related tensions from creeping into CBWM is imperative in building cohesion and team work, which are key ingredients in building adaptive water systems.

7.5.3 Political factors

Besides the social factors, there are challenges as regards changes in political regimes. The WSMTs were previously called the Water and Sanitation Development Board (WSDB). It has been the practice in Ghana to dissolve all Boards (Boards of Directors) of government sector agencies upon the coming into office of a new government. This is often broadcast through national television and radio stations. Some community members are ill-informed by national dissolution of Boards and, as such, they agitate that the Water Boards (now WSMTs) should also be dissolved.

The interview with the regional and national CWSA showed that the change from Water Boards to WSMTs was to minimise community agitation and to create a sense of team work among the members. Conversely, that has been cosmetic because the change in name is not reflected on the ground. Community members and even the WSMT members still refer to the WSMTs as Water Boards and correspondence to the District Assembly still use Water Board (see Appendix H). At the community level, especially in Babile, some sections accuse the composition of the water system management as coming from a particular political party. This is confirmed by an operating staff, who indicated that they receive threats such as *"we will change all of you if your party goes out of power"* (Excerpt from interview, 16th December 2013). This shows that WSMTs are still tagged to political regimes and a change in name was not enough to disabuse the minds of

community members. Therefore, division of community members over the membership of WSMT, in terms of political lines, does not support an effective CBWM.

7.5.4 Work environment and limited response to technological changes

The interview with the CWSA staff showed that the provision of office accommodation (in Busa and Babile) is to ensure that customers and visitors have easy access to management staff, and to create a convenient work place for the staff. The provision of office accommodation is a new package and, as such, the older water systems (Gwollu and Daffiama) did not benefit from it. Accordingly, in Gwollu, the customers either go to the revenue collector's house to pay bills or the revenue collector goes from house-to-house for collection. This has not been an effective strategy as identified by the customers and the revenue collector because there are no agreed schedules for payments. As such, the customers and the revenue collector often miss each other at home during revenue collection.

Although there is no office accommodation in Daffiama, there is a designated venue (drug store of the revenue collector[49]) for revenue collection. The drug store attendant was trained by the revenue collector on water bills payment procedures, and to receive payment in the absence of the revenue collector. In the early 2000s, the WSMT in Gwollu rented an office accommodation and staff were accessible. A customer complaint book was also kept in the office to receive water related concerns from the public. According to a key informant in Gwollu, CBWM hinges on innovation and commitment to duty by management staff, and renting an office accommodation was part of their innovation and commitment to CBWM. Unfortunately, the book could not be accessed because there is no longer an office accommodation.

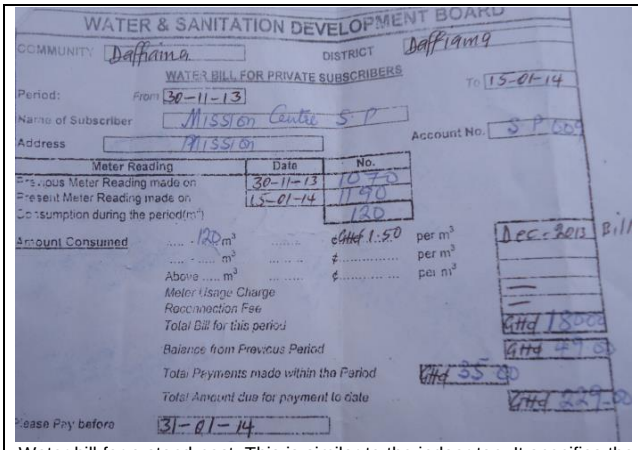
Apart from office accommodation challenges in two of the communities, the management staff are confronted with technological changes. It was found that none of the communities has information technology equipment such as computer and accessories or photocopier. However, the management staff are determined to live up to the technological challenge. Hence, instead of hand written official documents, the management staff rely on commercial centres for secretarial services (typing, printing, and photocopying). The challenge with this strategy is that confidentiality of official documents is not guaranteed. This also compels them to store all available data in hard copies, although without proper filling methods (see Figure 7.4). It was also established that in Daffiama and Gwollu, the operating staff do not have templates to capture the water production levels. It is worth noting that they were able to use notebooks to capture the water production level,

[49] The Revenue Collector is a professional teacher and also operates a drug store in Daffiama. As a native, he volunteered to carry out revenue collection after there were reported cases of financial misappropriation. Records on the payment of electricity bills show that since he took over as a revenue collector, the water system has been able to pay the arrears.

billing of customers and payments received. The challenge with this strategy, as observed, is that some pages of the records removed with time and this partially explained the lack of data series on water production, billing and payments in Gwollu and Daffiama. Discussion with Regional CWSA showed that accounting manuals, templates to capture production and consumption of water, revenue and expenditure of water activities have been developed. However, at the time of the study, these manuals were yet to be deployed to the small towns. Accordingly, the WSMTs and operating staff will have to be trained on their usage before distribution.

Furthermore, all the communities rely on hydro-electricity for water production. Frequent power outage and fluctuation have been identified as major disturbance of water supply. According to the operating staff, anytime there is power outage, the switch lever automatically turns off but has to be manually switched on when power is restored. With frequent power outage (averagely, four times a day), it has resulted in intermittent water supply, partially explaining the reliability assessment in section 6.4. Although not documented, the WSMTs have plans to procure gensets as backup power. Daffiama and Gwollu were using gensets to pump water to the HLTs (see Figure 7.4) prior to connection of the communities to the national grid (VRA hydro-electricity). These communities could not specifically indicate the state of the gensets because they have never been put to use since the introduction of hydro-electricity over eight years ago.

Figure 7.4 Work environment and technological challenges


WATER & SANITATION DEVELOPMENT BOARD

COMMUNITY Daffiama DISTRICT Daffiama

WATER BILL FOR PRIVATE SUBSCRIBERS

Period: From 30-11-13 To 15-01-14

Name of Subscriber Mission Centre S P

Address Mission Account No. S P 009

Meter Reading	Date	No.
Previous Meter Reading made on	30-11-13	1070
Present Meter Reading made on	15-01-14	1190
Consumption during the period(m³)		120

Amount Consumed ..... 120 m³ ..... @GH¢ 1.50 per m³

..... m³ ..... ¢ ..... per m³

Above ..... m³ ..... ¢ ..... per m³

Meter Usage Charge

Reconnection Fee

Total Bill for this period GH¢ 180.00 Dec-2013 Bill

Balance from Previous Period GH¢ 49.00

Total Payments made within the Period GH¢ 35.00

Total Amount due for payment to date GH¢ 229.00

Please Pay before 31-01-14

Water bill for a stand-post. This is similar to the indoor tap. It specifies the current tariff, water consumption, current bill, arrears, and the amount due for payment.


Water production records from 2010 to 2013 displayed on the office table. The records are mixed-up.


The book on the table is used to capture daily production. By the time the book is filled with the production records, some pages would have been removed or torn. See an old book on the table, which has almost half of the pages removed.


Researcher and WSMT Chairman struggling to gather data in the Chairman's living room. This is where some water data are kept due to lack of office accommodation. Without proper filing, official documents are mixed with private household documents.


Genset in Daffiama. A similar one is in Gwollu


Office accommodation in Busa. Babile has a similar office

Source: Field work, 2014.

Based on the institutional arrangements, the existing management practices, the set of factors that militate against CBWM, and the existing adaptation strategies used by communities, it is imperative to explore the appropriateness of CBWM approach in water delivery, more importantly from the beneficiaries of the water services. The analysis is based on discussions with management staff and the household survey.

7.6 Appropriateness of CBWM

Following a discussion on the management activities and the performance of the water systems in each community, the households were asked “is community-based management of the water system appropriate in this community”? Table 7.4 presents the responses of households on the appropriateness of CBWM.

Table 7.4 Households’ responses on the appropriateness of CBWM

Response	Babile	Busa	Gwollu	Daffiama	Total
Yes	70.3%	43.5%	36.0%	25.0%	42.7%
No	13.5%	17.4%	44.0%	40.0%	31.3%
Don’t know	16.2%	39.1%	20.0%	35.0%	26.0%

Source: Field work, 2014

On average, 42.7% of the households mentioned that CBWM was appropriate in their community while 31.3% indicated that CBWM was not appropriate (see Table 7.4 for individual community difference). The respondents were required to explain the answers on the appropriateness of CBWM (see Table 7.5). Limited knowledge of the operations of CBWM was the main reason for all those who could not tell the appropriateness of the approach. For instance, when asked about the appropriateness of CBWM, a respondent in Babile said: *“a child does not know the difference between a male and a female guinea fowl”* (Excerpts from HHS, 18th January 2014). This adage suggests that he has no knowledge of CBWM and other approaches to water management, and that makes it impossible to judge the appropriateness of the approach. Different views have been expressed about the appropriateness or inappropriateness of CBWM (see Table 7.5).

Table 7.5 Households’ views on the appropriateness of CBWM

Appropriate, Reasons	Multiple responses	Not appropriate, Reasons	Multiple responses
Management staff are sensitive to community concerns	68%	No transparency, non-involvement of user	76%
Support the decentralisation process and reduce dependency syndrome	35%	Favouritism (social ties) is a disincentive to CBWM	62%
The water system is not significantly different from a borehole with hand pump	4%	Government management is better due to neutrality	54.5%
Low tariff in relation to non-community-based management	27%	Outsiders can be held accountable	31%

Source: Field work, 2014

As shown in Table 7.5, 68% of the respondents mention that CBWM is appropriate in their respective communities because community members are familiar with community settings and, as such, are sensitive to community concerns about water. Others (35%) maintained that CBWM enables community members to take up their resource management responsibilities instead of depending on external organisations to provide and manage resources for the communities.

Another 27% of the respondents have the perception that tariff will increase with any management approach other than CBWM.

In contrast, 76% of the respondents are of the view that CBWM allows community members to misappropriate public funds because the water system is managed as if it were their private enterprise. According to these people, there is no community involvement in decision-making and it is difficult to indicate whom the managers are accountable to. Related to accountability, 31% hold the view that outsiders (non-natives) can be held responsible. Similarly, 54.5% of the respondents hold the view that government staff will be accountable to the top authorities, if management is given to government water agencies. This will moderate the favouritism and nepotism that have characterised CBWM which has been identified by 62% of the respondents. A woman in Daffiama sums it up in the following message:

> *"Natives, who are water managers, claim to know the good and the bad people within the community. Even when your bad deeds do not extend to water, they will forcibly extend it to water, and you will have water related problems. But an outsider-based (government) management will be neutral and fair to all community members. When the outsider is getting familiar and to be corrupted, we will agitate for his transfer. But who can transfer these people (natives)?" (Excerpts from Group Discussion, 12th March 2014).*

Slightly different was the case in Gwollu, where some individuals prefer community-based management but want settlers in Gwollu to be part of the water management staff. At the time of the research, all the WSMT members and operating staff were natives of Gwollu. According to a youth group and the key informants, this has a disadvantage because social bonding makes it difficult to hold them accountable. For instance, a member of the Youth group during an evening informal discussion on the current state of water management had this message:

> *"We want some of the settlers to be part of the WSMT/operating staff so that we can hold them accountable. For only natives to be the managers of the water system, we cannot, at most times, question their actions. This is because either one of them is your uncle, aunt, brother, in-law or your friend's relative. It is difficult to stick out and demand accountability. But if some are settlers, we can confront them on water issues that concern us" (Excerpts from Discussion with Youth Group, 1st March 2014).*

Interestingly, antagonistic reasons are presented (in Table 7.5) in favour and against CBWM. Many of the explanations against CBWM have a strong aspiration for long term durability of the water systems. They desire accountability, transparency, and non-favouritism in CBWM. However, the existing social system makes them difficult to be achieved, making *some* households perceive CBWM as inappropriate.

Beyond the household assessment, the appropriateness of CBWM was assessed using the water managers and the regulators. During the regional FGD, all the representatives from the four

communities argue that CBWM is appropriate but had concerns over the non-availability of complementary functions (see Table 7.1) from the regulators. However, participants from the regional and district levels suggested that WSMTs could consider a public-private partnership (PPP) in water management, since WSMTs are confronted with many challenges as revealed during the FGD. They further explained that the institutional arrangements for CBWM in a small town permit the government (in this case, DAs) to actively promote the involvement of the private sector in water management in a manner that will satisfy the operator, customers and public entities. According to the CWSA staff, they encourage communities that have a population above 10,000 and are at the same time facing management challenges to sub-let management to a third party.

In contrast, the WSMTs speculate that the aim of the private sector is to make profit and this often comes with high increment in tariff and that community members may protest if this happens in any of the communities. Moreover, during the inception phase, community members were made to understand that with their 5% capital contribution, the water system would belong to them and that redirecting ownership now (in simple terms) will create conflict as posited by the community representatives. Clearly, the WSMTs and operating staff were not ready to engage in any possible partnership with the private sector. A participant stated clearly: *"private sector! Not at all. We are able to contain our water management situation, why should we give it to the private sector?"* (Excerpt from Regional FGD, 8th July 2014). Participants from Gwollu cited Tumu water system[50] that was managed by a private operator as indication of what might happen for those who venture to go into PPP, where if PPP have been successful in the views of all parties, the community members would not have reclaimed the management of the water system.

7.7 Conclusion

This chapter has demonstrated the gaps between the normative institutional arrangements on the one hand and the existing practices of CBWM, which to some extent, have been *institutionalised* at the regulatory and the operational levels, on the other. The analysis has shown that, in principle, there is a well-structured set of actors and a detailed set of rules, specifically designed: to regulate how community members assume positions in CBWM; to specify functions that actors at the regulatory and operational levels are permitted and/or obliged to do; to regulate tariff setting, revenue mobilisation and administration of the water systems; to integrate customers and gender dimensions in CBWM; and to establish rewards and sanctions that come with each action.

[50] Tumu is a small town with over 11,086 population. In North-western Ghana, Tumu water system was the first to engage the services of a private operator. In January 2008, the Tumu Water and Sanitation Development Board and the District Assembly signed a five-year management contract with TBL Resources Ltd (the Operator) to carry out operation and management of the water system. In July 2013, the 'Water Board' called for a termination of the contract because the terms of the contract (benchmarks) and the respective obligations as spelled out in the contract were not met. The community request was granted and the community-level structures are now directly in charge of operation and maintenance.

The analysis of rules and the existing interactions among actors, using the institutional analysis and development framework, show that the rules are interconnected, with one rule feeding into another. While such an interconnected set of rules is important in CBWM, some actors, especially at the operational level, have been able to evade the rules to engage in practices that favour fraudulent activities. This is facilitated by inadequate oversight monitoring of the operational levels activities, limited information sharing, and lack of enforcement of sanctions. Despite the significance of information sharing among actors, it is done when there is a problem with the water systems. This approach does not promote proactive management because it does not integrate the views of the customers into water management to avert problems and this has contributed to customer dissatisfaction as presented in chapter six.

Therefore, a combination of factors: limited compliance of rules, especially the boundary, information and pay-off rules (especially the absence of enforceable penalty for rule breaking), perpetuated by social bonding and power asymmetries among actors have resulted in the current state of water systems performance: lack of accountability, free-riding and opportunistic behaviour, loss of revenue, mistrust of water managers, and inadequate customer participation in decision-making. In terms of female participation in CBWM positions, it was found that there is active participation at the inception stage of the water systems but many of the women resign or are side-lined with time. Hence, there is male dominance in CBWM, even though financial burden of accessing water for the household is borne by the women. In other words, the paradox is that those who determine the tariff (WSMTs who are dominated by men) do not mostly bear the financial cost of accessing water. Therefore, the analysis of the institutional arrangement and the existing management practices of both the operational and the regulatory levels have been useful in understanding the underlying causes of the current state of performance outcomes of water systems. The subsequent chapter discusses CBWM in the small towns in relation to other jurisdictions and more importantly, within the theoretical assumptions of CBWM. Such a discussion will better articulate the relevance of CBWM in small towns.

8 Discussions and conclusion

8.1 Introduction

This chapter links the analysis with the literature review and theoretical framework of the study. It examines the extent to which the field results are positioned within the available literature, the wider theory on community-based water management (CBWM), and to draw out the appropriateness of CBWM in small towns. Hence, the chapter draws together the preceding chapters in order to address the main research questions: (i) what is the existing performance of the water systems in small towns; (ii) what are the institutional arrangements for CBWM; and (iii) how do the institutional arrangements and existing practices of CBWM influence the performance of the water systems? The chapter is structured as follows: sections 8.2 discusses a summary of the findings and research contribution, drawing a connection between the water systems' performance outcomes and the institutional arrangements. By using the IAD framework to draw such a connection, it unearths significant stressors (see Figure 8.1) that affect the implementation of the institutional arrangements, thus leading to the current state of performance outcomes. The section concludes by highlighting the key theoretical and methodological contribution of the study.

The performance is discussed in section 8.3 in terms of the following: the pricing and revenue mobilisation and highlighting the associated equity concerns; managing water loss; and participatory water services delivery. This is followed by a discussion on the institutional arrangements for CBWM in section 8.4. Based on the discussion in the previous sections, section 8.5 draws a link between the institutional arrangements and the performance of the water systems: in respect of accountability, transparency and issues of trust, information sharing, ownership and control over water resource systems, and community-level cohesion. Given the empirical evidence and the theorised benefits of CBWM, the section also discusses the appropriateness of CBWM in small towns, highlighting the role of the state and civil society in CBWM. The recommendations of the study are presented in section 8.6. Finally, section 8.7 draws a conclusion on CBWM in small towns and the implications for the wider field of community-based natural resource management.

8.2 Summary of findings and research contribution

> *In analysing institutional arrangements in relation to policy outcomes, "there is often the tendency to assume that an institutional arrangement is performing well when the policy is achieved; and that a failure to achieve a policy means that the institutional arrangement is flawed" (Imperial and Yandle, 2005:506).*

The above quotation, which has been observed by Imperial and Yandle in the fisheries sector, applies to the water sector. Although the above statement can be true, an institutional arrangement does not necessarily relate to performance outcomes (Imperial and Yandle, 2005). Nonetheless,

this assumption has pervaded institutional reforms in many sectors, including the water sector. That is, it is assumed that an appropriate institutional arrangement should lead to effective (transparent, inclusive, equitable, and accountable) outcomes in water management. As a result, the focus of international fora and governments has been on searching for an institutional arrangement that can bring about effective water policy outcomes, especially in rural and small towns. This has resulted in several institutional reforms, especially in sub-Saharan Africa (SSA), leading to the current community-based management approach. This approach received international recognition and consequently donors and governments embraced it as the solution to the challenges of the water sector.

In Ghana, after several reforms in the water sector, the current focus is on the National Community Water and Sanitation Programme (NCWSP), which seeks to provide sustainable potable water to small towns and rural communities through a community-based management approach, as it is with other SSA countries. While there have been many studies on rural communities, little is known about CBWM in small towns. Additionally, in instances where there have been studies in small towns, the focus has been on performance measurement. A focus on performance measurement has led other researchers to conclude that: CBWM is not appropriate for small towns; water systems cannot be sustained without external support; there is the need for delegated management; and the voluntarism aspect of CBWM has outlived its usefulness and there is the need for professionalism in CBWM (see, for instance, Doe and Khan, 2004, Moriarty et al., 2013, Gbedemah, 2010, Harvey and Reed, 2004, Harvey and Reed, 2006a). However, in doing so, they failed to question the institutional arrangements for CBWM and how it is manifested in the community settings, on the one hand, and the *ability* of the institutional arrangements to evolve and adapt when performance is lacking, on the other. Hence, studying CBWM in small towns should include (a) how the institutional arrangements affect performance and (b) how they can be changed to improve performance.

Therefore, this study argues that analysing performance outcomes *alone* results in a misrepresentation of CBWM and fails to understand its dynamics in small towns: arguing for an integration of institutional analysis into the study of CBWM. To fill this research gap, this study examined how performance is *shaped* by the institutional arrangements and practices, and how outcomes are able or unable to shape the institutional arrangements. Such an analysis is necessary because institutions affect and are affected by the actors' behaviour and the pattern of interactions. The analysis of CBWM identified stressors that affect the pattern of interactions within the institutional arrangement, which ultimately affect the performance outcomes.

8.2.1 Key findings ("Stressors") of community-based water management

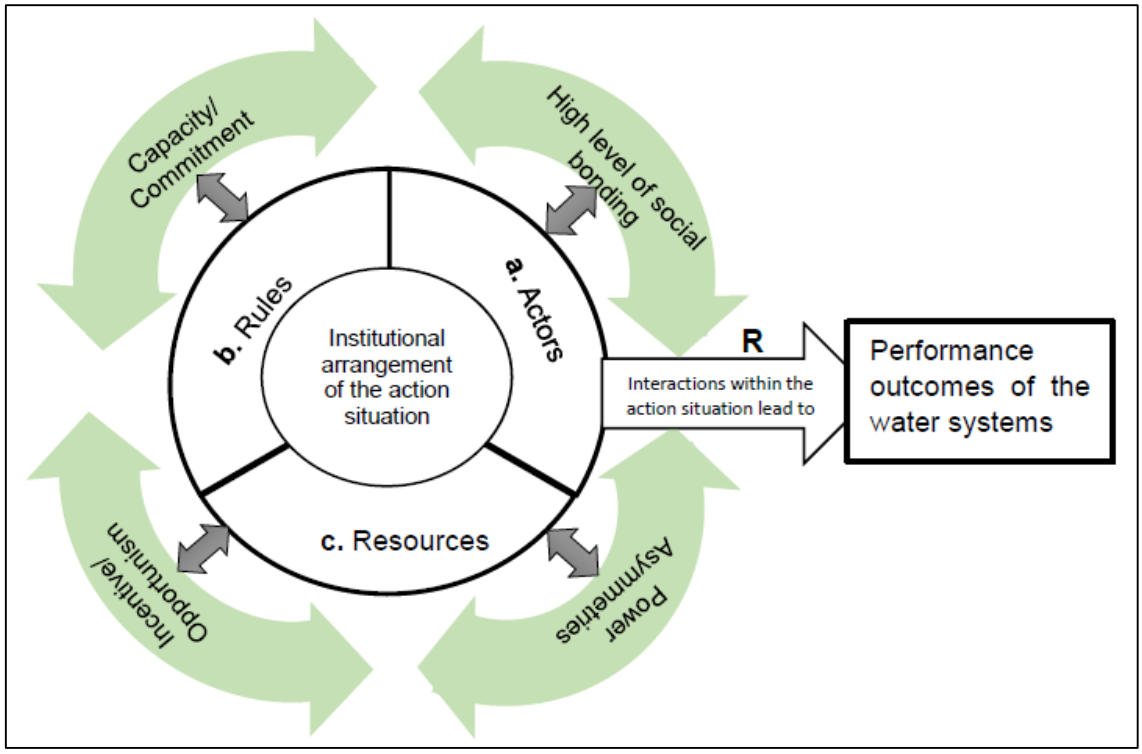
The analysis of CBWM in this study was based on a unique approach, "backsolving" (see Edwards and Steins, 1999), whereby the study first examined the performance of the water systems based on the evaluation criteria[51] (analysed in chapter six). The results of the evaluation criteria necessitated an institutional analysis taking into account the actors, resources, and the rules that regulate their interaction and usage of resources.

It is worth emphasising that the pattern of interactions within the institutional arrangements transform actions into performance outcomes (Kiser and Ostrom, 2000). However, this study established that performance outcome does not *solely* depend on the institutional arrangements per se, neither does it depend on the physical characteristics of the water infrastructure, as also noted by Madrigal et al. (2013). Instead, the performance also depends on a continuum of contextual factors (Edwards and Steins, 1999) and the ability of institutional arrangements to respond to these factors as they evolve (Edwards and Steins, 1999, Ostrom, 1995).

The institutional analysis, using the IAD framework, unravelled four major stressors (see Figure 8.1) which serve as the cause of the institutional arrangements for CBWM not producing desired performance and equally prevent the institutional arrangements from evolving to respond to them. These stressors are: (i) desire for personal gains or excessive incentive, which leads to opportunistic behaviour, with its presence, especially at the operational level, raising questions about the voluntarism nature of CBWM organisations; (ii) limited capacity and commitment of management staff, including the regulatory level; (iii) power asymmetries, especially among actors at different levels, and (iv) high level of social bonding within the communities, as shown by the green arrows in Figure 8.1 below.

[51] The performance analysis (evaluation criteria) is based on: (i) financial and technical efficiency; (ii) water reliability, quality, and pressure; (iii) consumer satisfaction with management activities and service delivery; and (iv) governance (accountability, transparency, participation in the decision-making process).

Figure 8.1 Stressors of the institutional arrangement that affect outcomes in CBWM



Source: Author's construct, 2015

The analysis of the institutional arrangements shows that the *actors* (**a**) at the multiple levels are required to interact according to a set of *rules* (**b**) in order to access and/or generate, and use *resources* (***c***), such as finances, information, technical skills and spare parts, to manage the water systems (see Figure 8.1 above). Rules are part of the daily activities of the actors and, as such, they are core components of the action situation (see Figure 8.1). An institutional arrangement that is characterised by interaction between actors using resources in accordance with a set of rules should lead to the desired performance outcomes (see arrow '**R'** of Figure 8.1), other things being equal. As indicated in the opening of this section, this assumption was the trigger in many institutional reforms in the sector, leading to a CBWM approach, with the hope of achieving sustainable water services delivery. The declared institutional arrangements for CBWM in the small towns take into account: accountability and transparency; participatory decision-making process; oversight responsibility by state actors over the water systems; control over the water systems and other public drinking water sources; and clear procedures for tariff setting, as demonstrated in chapter seven above. However, the institutional arrangements are affected by four key stressors, which are shown in Figure 8.1 and discussed below. These stressors percolate the subsequent sections.

Incentive and opportunism: The analysis of the existing practices in relation to the rules of CBWM (see section 7.3) shows that the actors at multiple levels (analysed in section 7.2) are not

working according to the institutional arrangements. The cause of this gap is sequential. Incentives to the actors (see pay-off rules in Table 7.2) are part of the institutional arrangements and are used to reward or sanction the outcomes of activities (Ostrom et al., 1993). However, at the regulatory level, the desire for an *excessive* incentive (personal gains) overrides commitment to duty, thus resulting in limited follow-ups and feedback on CBWM: affecting the action situation. It has been established that there is huge investment in small town water systems, including monitoring during implementation (see World Bank, 2011, World Bank, 2009), and this serves as incentive to actors at the regulatory level for effective monitoring during the *implementation* of water projects (see analysis of funding in section 7.4). Hence, this study found that there are adequate measures in place to ensure a successful implementation of new water projects. Unfortunately, there is no corresponding commitment and investment in terms of time and financial resources for monitoring and providing other complementary functions to ensure that actors, especially the operational level, act on the bundle of rules that are designed for the running of the water systems. This leads to malpractices of some water managers (discussed further in sections 8.3 and 8.4 below). Hence, non-compliance of CBWM rules leads to an individualistic behaviour, where commitment is giving way for personal interest. This has implications for follow up activities, especially by donors, on the implementation of the institutional arrangements for on-going water systems.

The capacity-commitment divide: The study also established that there are capacity challenges, especially financial management capacity, at the operational levels. Beyond capacity, the laxity of operating staff to follow financial administration procedures (see section 7.3.2) contributes financial malpractices. Although the institutional arrangements make provisions for continuous training of operational level structures, in practice, this is not done because of the popular "lack of funds" at the regulatory levels. Continuous training is a core component of CBWM because community members should not be expected to have perpetual knowledge because new management issues emerge and there are changes in management staff (see, for example, Christina et al., 2013). As such, this study supports the argument that a lack of funds should not be used as an excuse for the lack of support to the water sector (see similar arguments in chapter three by Mehta, 2014, Biswas and Tortajada, 2010). On the other hand, the laxity of operational staff is attributed to lack of regular monitoring of their activities, thus giving them excess "freedom" to sometimes engage in illegitimate activities (see elaboration in section 8.3 below). Thus, it is important to distinguish between non-commitment to duty and lack of capacity to carry out one's duty. Such a distinction allows decision makers to apply the appropriate strategy to address CBWM lapses.

Power asymmetries: This is a major constraint to the enforcement of CBWM rules and it directly affects revenue mobilisation, accountability and participatory decision-making, as demonstrated in sections 8.4 and 8.5 below. For example, as established in chapter six, water managers are able to disconnect households for non-payment of water bills but they are unable to do the same for government departments and their staff, leading to low revenue generation, thus supporting the empirical literature (see, for example, Bardhan and Mookherjee, 2006, Gbedemah, 2010), as demonstrated in section 8.3.1 below. The findings on how asymmetrical power relationships influence the functioning of the CBWM rules support the argument by Clement (2010) that the working of the institutional arrangement is shaped by power distribution. Power dynamics in water governance is not limited to developing countries because in England it serves as a constraint to participatory water governance (Whaley and Weatherhead, 2015). The presence of power dynamics in water management in developed countries reaffirms the argument of this thesis (see elaboration in section 8.5.4) that appropriateness of CBWM is not necessarily related to population size/degree of urbanisation nor the level of poverty. Hence, mechanisms to overcome power asymmetries among actors are required in CBWM. Although the use of a "corporate strategy" requires further investigation in CBWM in small towns, it has been argued that it can minimise power asymmetries among actors (see Whaley and Weatherhead, 2015 in section 4.3.2). In CBWM, a "corporate strategy" takes the form of a public-private partnership, where operation and maintenance of the water system is outsourced to a private operator. Such a partnership however requires critical examination in order to establish the relationship, including any implicit power dynamics and actor interest, among state actors, the community members and the private sector.

High level of social bonding: Linked to power asymmetries is the presence of social bonding, which is linked to the socio-cultural setting of the communities. The discussions in the previous chapters indicate that socio-cultural factors, which existed before the current CWBM, continue to filter into CWBM of small town water systems. Thus, beyond the declared formal institutions, there are entrenched socio-cultural norms that continue to play important roles in how the institutional arrangements work. The theoretical argument is that social cohesion at the community level is a positive tool for CBWM (see discussion in section 8.5.4 below) and, consequently, CBWM is premised on the existence of positive community cohesion and enhanced accountability (see Isham and Kähkönen, 2002b, Blaikie, 2006, Bakker, 2008, Flora, 2004, Kahkönen, 1999). On the contrary, this study has established another side of social cohesion, which makes it a "double-edged sword". That is, social cohesion has both favourable and unfavourable implications on enforcement of CBWM rules: community-based water managers are not accountable and the presence of social bonding restrains the users from holding managers accountable for their actions (elaborated in section 8.5.1 below). Therefore, as the norms and customs of the

community remain significant, they *limit* the implementation of accountability and transparency in CBWM.

The presence of these stressors shows that although it is necessary to have a well-thought-out institutional arrangement, achieving the desired performance goes beyond such an institutional arrangement. In other words, in complex resource systems, such as water systems, a simplistic relationship between institutional arrangements and outcomes is rare (see also Pahl-Wostl et al., 2011).

8.2.2 Research contribution

This research has contributed to the wider theory on community-based natural resource management using a unique approach. Numerous studies have been conducted using institutional theory and particularly the IAD framework in natural resource management. Similarly, studies have been conducted on CBWM and, to some extent, in small towns in Ghana. However, studies that seek to analyse the link between the performance of the water systems and the institutional arrangements have been rare, and this study filled this knowledge gap. More significantly, this study extends the IAD framework to an analysis of CBWM in small towns: demonstrating how the institutional arrangements and practices, that is, how actors are interacting according or contrary to the CBWM rules, are leading to water systems' outcomes. Based on the analysis of the rules formation and compliance, the study also argues that internalisation of rules, although significant to rule compliance, does not automatically lead to compliance of CBWM rules in small towns.

Methodologically, this study presents innovative insights to scientific research that involves multiple actors and multiple levels. In order to critically examine CBWM, the primary data collection started at the household level, through the water managers to the District Water Sanitation Teams and finally the regional level focus group discussion, using different but complementary tools. Such an approach improved the validity and reliability of the data, while minimising apportioning of blame among actors on failures in some aspects of CBWM. This study has gone beyond the analysis of performance outcomes of CBWM to analyse the rules and through a "backsolving" approach was able to identify the root causes (stressors) of existing performance outcomes of the water systems. The outcome of such an analysis can lead one to debunk the theorised benefits of CBWM which assumed a *simple* relationship between decentralised CBWM and improved performance of the water systems. In other words, this study argues that "*closer*" to the people is good and a promising approach to water management but does not *simply* translate into the desired outcomes in water management. Hence, drawing a link between outcomes and institutional arrangements in a single study using empirical results demonstrates to stakeholders,

especially practitioners/policy makers and also academics, the significance of addressing management challenges through a critical analysis of the outcomes and the pattern of interaction that produced the outcomes.

Additionally, this study contributes uniquely in examining the interaction of actors, by bringing major actors at the operational and the regulatory levels of all the four cases to a common platform (dubbed regional focus group discussion) to critically discuss how they interact, both in principle and in practice and with what rules. This platform also reduced the blame-game among actors on failures in CBWM because as the discussion proceeded, the participants themselves recognised their own lapses in carrying out their duties, signifying that the failures are a shared responsibility.

The findings of the research also contribute to the literature on community ownership of water systems: in practice, there is lack of legal ownership of the water systems by the communities, although *some* community members argued that they 'own' the water systems. The lack of ownership as indicated by *other* community members is attributed to non-payment by community members towards the acquisition of the water systems. Therefore, the elimination of community capital contribution, as a government policy, is gradually reintroducing paternalism in water services delivery.

As part of the research contribution, this study points out how the interaction, sometimes conflicting, between formal and informal institutions impacts on the functioning of the water systems, particularly in relation to the presence of alternative sources of water. Although the WSMTs are expected to have control over all public water sources, their control is limited to the small town water systems while the alternative sources are managed by their respective sections, sometimes with the backing of traditional authorities: traditional norms and values require that the views of traditional authorities be respected by all who fall within their jurisdiction. Hence, the tension between the need to follow informal rules (traditional norms and values) and the need to comply with the formal institutional arrangements hinders the functioning of CBWM of small town water systems.

In addition to the methodological and theoretical contribution of the study, several direct benefits emerged in the field in terms of managing the water systems. Drawing actors to a common platform to deliberate on CBWM has rekindled actors to their core responsibilities. The outcome of such an interaction led to an audit of two WSMTs accounts while broken stand-posts were repaired, as later testified by the operational level staff. The uniqueness of this approach and the

benefits that emerged further justify the need for multi-level forums to be formalised in the institutional arrangements.

Based on the summary of the research findings, the following sections discussions the key research questions. The sections elaborate on how the four stressors presented in the summary have affected the functioning of CBWM and the need to re-examine the theoretical arguments for using CBWM as the preferred approach to water services delivery, especially in small towns.

8.3 Performance outcomes of CBWM

This section discusses the first research question: what is the existing performance of the water systems in small towns in North-western Ghana? It seeks to examine the *state* of water delivery in small towns in North-western Ghana. The fundamental objective of providing potable water to the populace, that is, increased access to potable water, has been achieved in the four cases. The presence of the water systems also serves, indirectly, as a source of employment because increased available of water has enabled individuals to use the water to promote their small scale industrial/commercial activities (see section 6.2.1). Despite the increase in access to water, there are procedural and managerial gaps in CBWM, which are discussed in the subsequent sub-sections.

8.3.1 Water pricing, revenue mobilisation and management

The revenue pattern of the water systems is mainly explained by the water demand, which is further influenced by the presence of unregulated alternative water sources (see section 6.5.4). This has reduced the effective demand of water, similar to findings established by Eguavoen (2008) and Gbedemah (2010) in southern Ghana and Manyena et al. (2008) in Zimbabwe, leading to low revenue. Hence, a critical examination of the *ability* of WSMTs to take control of alternative public sources of water within small towns is necessary.

It has also been argued that communities are too poor to be able to pay for capital replacement cost and other expenses (Harvey and Reed, 2006a, Gonzalez-Gomez et al., 2011, Laryea, 1994). However, the findings of this study show that unwillingness of customers, especially the government departments and their staff, rather than ability is the main reason for non-payment of water bills. For example, as demonstrated in section 6.3.2, the District Assembly did not need to pay for the cost of capital replacement in Gwollu if the government departments had paid their water bills, which was twice the capital replacement cost.

In terms of paying water bills, free-riding, especially by the government departments, their staff and local elite, has become common practice in water systems management, as established by others (Bardhan and Mookherjee, 2006, Biswas and Tortajada, 2010, Gbedemah, 2010). In fact non-payment of water bills has become a norm ("*institutionalised practice")* among them, as demonstrated in section 6.3.2. In *other* studies, such practices were seen to be successfully changed in order to improve revenue generation (see, for example, Biswas and Tortajada, 2010) (see elaboration in section 3.3.3). However, in this study, attempts at reversing this opportunistic behaviour through graduated sanctions (see Ostrom, 2005) have not been successful due to the entrenched power asymmetries (see section 8.2.1 above) and, as such, government officials and departments still owe fees to the water system. The presence of departmental debts is distressing to CBWM, given that poor households are able to devise strategies (see section 6.3.3) to raise money to pay for water bills, yet government departments and their staff do not pay their water bills. Therefore, the status of defaulters confirms my argument that the challenge is not with the *ability* to pay but the *willingness* to pay, partly because of the political and administrative authority that the defaulters have over the water managers (see an analysis of the institutional arrangements in section 7.2).

As a result, despite the presence of pay-off rules to disconnect water supply to defaulters, some defaulters (government departments and prominent individuals) have sufficient authority over the water system managers, to stop them enforcing this rule (see section 8.4 below for further discussions). Therefore, rather than poverty, emphasis should be placed on settlement of bills by government departments, increasing public transparency in billing and regular financial auditing to minimise misappropriation of funds and this requires a broader review of the *working* of the institutional arrangements, by practitioners and donors. The need to de-emphasise poverty is confirmed by the household survey, which shows that the tariffs, although higher than urban tariffs, are nominally within the means of the majority of the households (see section 6.3.3) and they actually pay their bills. The above discussions complement other findings which revealed that loss of revenue is attributed to weak control over payment of bills, fraudulent activities of managers and customers, and weak monitoring of water supply networks (Gonzalez-Gomez et al., 2011, Biswas and Tortajada, 2010, Rouse, 2013). Hence, this study debunks the use of poverty as an excuse for inadequate funds to finance the expenses of the water systems.

Besides free-riding, which creates injustice in water services delivery, the tariff structure and setting process push the financial burden of water services to the rural and small town populace. Unlike the small town water sector, where Districts Assemblies are the regulators of tariffs, the *urban* water sector, for example, in Ghana, has a single independent regulator, the Public Utilities

Regulatory Commission (PURC)[52] (see Government of Ghana, 1997). In small towns, the water and sanitation management teams (WSMTs) are constitutionally mandated to propose tariffs, based on the water production and distribution costs, and seek approval from the District Assemblies (CWSA, 2014a, CWSA, 2010) *before* the proposed tariffs can be implemented (the analytical framework in section 4.3 and the analysis in section 7.2 elaborate this nested relationships). Contrary to these provisions, there is neither technical calibration of the tariff in these small towns, based on any of these parameters, nor an approval from District Assemblies: tariffs are set completely by the WSMTs. This has resulted in different tariff structures in small towns, whereas all urban centres have a uniform tariff (see section 6.3.3). Therefore, the lapses in tariff setting is a "bidirectional failure". That is, while the WSMTs have not submitted proposed tariffs to the District Assemblies, the District Assemblies, on the other hand, have not enforced the specified procedures that require WSMTs to submit proposed tariffs for vetting and possible approval. Hence, higher tariffs are expected in small towns because tariff setting is now entirely at the discretion of the operational level water managers.

The small town-urban tariff differential appears to be the situation in many parts of Ghana because Gbedemah (2010) also found that the tariff of small town water systems in southern Ghana is higher than the urban tariff. Similarly, in Namibia, it was found that the poor in rural areas were overcharged for water in relation to their urban counterparts (Neef, 2009, Falk et al., 2009). The equity implications are exacerbated in a situation where rural and small towns are required also to pay a percentage of the capital cost of the water projects while their urban counterparts do not pay, leaving rural and small town water customers overtaxed in water services delivery. Therefore, while the essence of a decentralised system is partly to reduce the financial burden on government (Isabelle, 1999, Anwandter and Ozuna, 2002), it has excessively shifted the financial burden to communities, particularly to women.

In terms of financial management, it has been argued that it is improved where there are complementary functions from governments, private sector and water service authorities (Opare, 2011, Harvey and Reed, 2006a, Smits et al., 2013, Biswas and Tortajada, 2010). This is supported by the findings of this study because the financial management of water systems has generally been poor, partly due to weak monitoring and limited capacity to administer funds. The empirical literature further shows that poor water management, including financial management, is also associated with a spatial misfit: that is, a situation where the geographical location of the water

[52] PURC was established by an Act of Parliament (Act 538 of 1997). The PURC examines and approves rates chargeable for provision of utility services, protects the interests of consumers and providers of utility services, and monitors the standards of performance for service provision. The District Assemblies are expected to play similar roles as required by L.I. 2007. Based on variables such as the cost of water production, transmission and distribution, PURC uses an automatic adjustment formula to review the rates of utilities in every quarter.

resource is different from the resource management organisation (Herrfahrdt-Pähle, 2014, Manyena et al., 2008, Christina et al., 2013). However, this study established that even where there is great spatial fit (in terms of the water systems' location, the management organisation and the regulatory body), as it is in Gwollu, poor financial management still exists. This is due to: (i) internal wrangling within management staff due to usurpation of roles (see analysis in section 7.5.2); (ii) lack of intervention by the regulatory body in wrangling; and (iii) non-adherence to rules for monitoring, supervision, coordination and financial administration, which facilitates financial misappropriation at the operational level. Therefore, there is more to CBWM than the spatial location of the water resources and, as such, the fact that resource managers are closer to the resource does not guarantee successful management.

8.3.2 Water loss and efficiency

Water loss, an indicator of technical inefficiency, has been identified as having significant implications on revenue loss. It is argued in this study that managing water loss is a shared responsibility between the customers and the management organisations. However, rather than cooperating to minimise water loss, customers and managers engage in a blame-game which finally reduces the ability to minimise water loss (see section 6.3.2). Moreover, although management staff are knowledgeable of the sources of water loss and how to track it, the quantity lost has never been assessed: due to laxity of management staff and weak monitoring from the regulators. The causes of water loss, especially through leakages (see analysis in section 6.3.2), reinforce the call on the customers to take *responsibility* for the entire water system, as argued by some scholars (see Harvey and Reed, 2006a, Schouten and Moriarty, 2003, Juma and Maganga, 2005, McCommon et al., 1990, Cleaver and Toner, 2006) (elaborated in section 2.4.4). Taking responsibility for the water systems requires the collaborative efforts of all actors, including the customers.

8.3.3 Participatory water services delivery

Participatory water management is discussed in terms of female representation on management bodies and customer participation in decision-making processes. In terms of women's participation, studies have recognised their involvement in water management as fruitful (see, for instance, Cleaver, 1999, Madrigal et al., 2011, Bhandari and Grant, 2008, Raha et al., 2013). In Ghana, the institutional arrangements also create room for active participation of women in water management (CWSA, 2011, CWSA, 2014d). On the contrary, the study established that, despite their significant role in household water services, including payment of water bills, women have been side-lined in water management, which compelled some of them to formally resign while others exist as members of water management in principle only. At the general community level, even when meetings are held, the voices of women are barely heard. Thus, the women's

substantive role is relegated to the household level water services delivery. This implies that tokenism[53] which has characterised participation, especially of women (see, for instance, Prokopy, 2004, Gbedemah, 2010, Raha et al., 2013) still exists in CBWM, and the full benefits of integrating women into CBWM may never be realised, as women continue to be marginalised.

Customer participation has been identified as significant in decision-making in CWBM (see Madrigal et al., 2013, Harvey and Reed, 2006a, Doe and Khan, 2004). It is a means of ensuring transparency because customers' participation in decision-making satisfies their intrinsic psychological needs and makes them feel that, procedurally, there is justice (DeCaro and Stokes, 2013, Rouse, 2013). For instance, it was established that there is a relationship between customers' willingness to pay water bills on the one hand and the state of transparency and tariff setting procedures on the other (see Rouse, 2013, Schouten and Moriarty, 2003, Manyena et al., 2008, Prokopy, 2005). Remarkably, despite the presence of arbitrary tariff setting and lack of transparency in the communities, households are committed to paying water bills for the following reasons: the central role of water in households' activities; the desire to ensure that there are funds to run the water systems; and the fact that their water supply will be disconnected if they fail to pay the bills (see details in section 6.3).

Despite the rules on user-WSMT engagement, there has been no such engagement for the past twelve months as at the time of the field work. This has left users largely uninformed about water management activities, leading to a mistrust of management activities. What worsens the mistrust is that community members were involved during the mobilisation stage (raising money for capital cost), and at a time that the water systems are yielding revenue, they are not involved in any decision-making process nor do they know how the water revenue is expended. This contributes to the argument by Cornwall (2008) that having communities' members involved in the process of a project does not guarantee that they will have a strong voice in the rest of the project management and outcomes.

Theoretically, while CBWM seeks to instil a "degree of citizen power" (see Arnstein, 1969 ladder of participation) and empower community members (see Doe and Khan, 2004, Cleaver and Toner, 2006), the empirical results show that it does so at the expense of the general community members (also established by Cleaver and Toner, 2006, Kellert et al., 2000). The reality is that only the operational level *staff* control CBWM while the rest of the community members serve as spectators and users (see analysis in section 6.5.4). This practice tends to defeat the fundamental

[53] Situation where names are merely listed on paper as members of the water management bodies.

tenets of CBWM: customer involvement in decision-making, transparency, and accountability of water managers to both regulator and customers.

The discussions on performance further raise questions about the institutional arrangements for CBWM and the implications on the wider community-based natural resource management.

8.4 Institutional arrangements: a polycentric model of CBWM

The second research question seeks to analyse the institutional arrangements for CBWM in small town water systems. This was done using the IAD framework. It has been suggested that using the IAD framework for institutional analysis should take into account the attributes of a polycentric system of governance (Nunan, 2015, McGinnis, 2011). It needs to integrate the multiple levels of actors, decisions and rules, which are expected to function consistently through interaction (Ostrom, 2005). It has been argued that a polycentric system of governance is appropriate for community-based natural resource management because it promotes interactions, regulation and facilitation among the actors at *multiple* levels within a resource system (see, for example, Hill and Engle, 2013, Andersson and Ostrom, 2008, Ostrom, 2005, Mansbridge, 2014, Huitema et al., 2009). Specifically, the presence of several actors at multiple levels and across sectors is necessary and has the potential of promoting adaptive capacity in resource management (Huitema et al., 2009, Rijke et al., 2013, Berkes and Ross, 2013, Robinson and Berkes, 2011, Ostrom, 2005). Based on the IAD framework, the institutional analysis demonstrates that the institutional arrangements for CBWM depict a polycentric model of governance. For emphasis, the institutional arrangements for CBWM, as demonstrated in section 7.2, recognise and incorporate the multiple levels of actors in CBWM and the role of non-water related actors in CBWM, while providing for downward and upward accountability among actors and transparent decision-making processes. The following sections discuss such institutional arrangements for CBWM, focusing on the rules and the actors.

8.4.1 Community-based water management rules

While "institutions play a role in every part of our lives" (Nunan, 2015:59), "we cannot compare water to anything on earth" (Excerpts from group discussion, 12th December 2013).

The above quotations bring together two important things is our daily activities: everyone needs water on a daily basis and to ensure that this necessity is attained, there is the need for institutions to shape access to water. Thus, rules remain significant in resource management, especially common resources which involve many actors. As demonstrated in chapter seven, the analysis of rules showed that they were designed to empower the actors, especially at the regulatory and the operational levels, to take decisions and actions that will promote the functioning of the water systems. Concurrently, due to an anticipated individualistic behaviour among actors, the rules are

crafted to constrain actors' interaction, as emphasised by many scholars (North, 1990, Ostrom, 2005, Saravanan, 2008). This implies that without rules to *constrain* actors, there is the tendency for them to "excessively discharge their authority", sometimes *beyond* the existing legitimate authority that is contained in the CBWM rules. This can be detrimental to CBWM. As demonstrated in section 4.4 and section 7.2, the rules are nested across water governance levels, providing quality assurance in CBWM.

The IAD framework requires researchers to go beyond rule identification and to critically analyse them in their research (Blomquist and deLeon, 2011). A critical analysis of the rules in CBWM shows that despite the classification into seven working rules (see Ostrom and Basurto, 2011, Ostrom, 2005), they are not mutually exclusive but feed into one another. They are best described as "interlaced-rules of operation", of a self-regulatory system of monitoring within and between the operational and the regulatory levels. In fact, the findings of this study show that a failure or non-compliance of one actor, especially in working according to the rules, can disproportionately affect an entire network of interactions. This clearly demonstrates the *emergent* property of many complex adaptive systems (see Holden, 2005), in which a small change in a system component can have corresponding large effects on the entire system. This implies that working with these rules requires the collaboration of all actors.

Despite the significance of interaction and coordination in a polycentric system of governance (see Pahl-Wostl et al., 2012), there is limited interaction between the water managers and the customers on the one hand, and the water managers and the regulators on the other (vertical interaction). Similarly, there is no horizontal interaction among water managers in different communities, depriving them of knowledge sharing and innovation. The absence of interaction among actors has further created a gap in coordination of the multi-functions, multi-levels and multi-sectors that characterise CBWM.

Therefore, it is appropriate that the rules in CBWM are a combination of collaborative rules and control rules (Brown et al., 2012). This has been recognised and catered for in CBWM in small towns in Ghana. That is, the rules provide for collaboration: at the operational levels; between the operational and the regulatory levels; and among the operational, the regulatory and the private sector (area mechanics and NGOs), as demonstrated in section 7.2. In addition to rules for collaboration, the regulatory level, as and when appropriate, controls the operational level. Similarly, at the operational level the WSMTs *control* their employees (operating staff and vendors), as analysed in section 7.2.

Given the nature of the rules, it is undeniable that they play a central role in resource management and several scholars attest to that (see, for instance, Saravanan, 2008, Bettini and Brown, 2011, McGinnis and Ostrom, 2014, Ostrom and Basurto, 2011, Nunan, 2015). While the rules are expected to guide any action of the actors in resource management (Ostrom, 2011, Saravanan, 2008), the empirical results show that the desire for personal gain or rent seeking behaviour, amidst lack of enforcement of sanctions, has resulted in actors taking actions that are contrary to the rules. This is contrary to the argument that once rules are internalised, they are adhered to, irrespective of individual parochial interests (March and Olsen, 2004, see Ostrom, 2011). Self-interest may affect compliance, and in such situations, coercion can be used to ensure compliance (see, for example, Mansbridge, 2014, Scott, 2008). In other jurisdictions of water management, pay-off rules (sanctions) in particular, were strictly enforced and this ensured compliance with other irrigation management rules (Ostrom and Basurto, 2011).

The empirical evidence in this study shows that the presence of power asymmetries between the regulatory level actors and the operational level actors serves as a barrier to rule enforcement, through coercion, as demonstrated in Figure 8.1 of section 8.2.1. Hence, notwithstanding the presence of rules and the fact that the management staff are knowledgeable of them and were part of the process of designing the rules, some members violate them to engage in unauthorised activities because the pay-off rules (sanctions) are not enforced. Lack of individual moral values, as also noted by Gonzalez-Gomez et al. (2011), partly explains the unauthorised activities of some actors. Thus, opportunistic behaviour, as stressed by Ostrom (Ostrom, 1995, Ostrom, 2005, Ostrom et al., 1993), is facilitated by weak monitoring from the *regulatory level*, coupled with limited user knowledge of the institutional arrangements, especially CBWM rules. Therefore, this study shows that rules remain worthless unless they are enforced: it is not enough to design a set of well-thought-out rules (see Table 7.2) without complying with them.

Additionally, it is equally important for all those affected by rules, especially customers, to understand the workings of these rules and contribute to their enforcement, or otherwise “buy into them”. The empirical literature shows that there is a relationship between knowledge of rules and enforcement (see, for instance, Opare, 2011, Schouten and Moriarty, 2003, Madrigal et al., 2011, Ostrom and Basurto, 2011). For instance, with adequate knowledge of boundary and choice rules, community members followed due process to remove management staff for non-performance (Madrigal et al., 2011, Opare, 2011). In some communities, especially in Gwollu, customers are dissatisfied with the performance of the WSMTs, but they are uninformed of the necessary formal procedures that need to be followed in expelling them, even after their term of office has elapsed. Consequently, some WSMTs exist illegally because their tenure of office has elapsed and there

has not been any reconstitution (see section 7.3.1). At the operational level, many customers especially are uninformed about the institutional arrangements for CBWM (see section 7.3.4). However, from a polycentric perspective, a key function of the regulatory level is to *coordinate* and *monitor* compliance and where necessary impose sanctions for defection (see Mansbridge, 2014, Neef, 2009). This is particularly desirable because an organisation (the District Assembly) at the regulatory level is championed as the legal owner of the water systems. Unfortunately, such a monitoring is lacking because of the stressors in section 8.2.1 above. The lack of coordination in decentralised resource management, as established in this study (see also Pahl-Wostl et al., 2012), results in incoherent water management, leading to weak performance.

In relation to rule enforcement, other researchers argue that the best approach is to use the local community itself (Madrigal et al., 2011, Madrigal et al., 2013). While their studies did not delve into the social dimension (bonding), the impact of social bonding as established in this study challenges the highly assumed homogeneity, trust and resource mobilisation that are expected to come with CBWM. Social bonding makes it difficult for some people at the operational level, who are even knowledgeable of the rules, to objectively enforce them. Although governments and non-state actors are projected to play a facilitative role in rule enforcement at the operational level (see Mansbridge, 2014, Neef, 2009, Falk et al., 2009, Opare, 2011), the presence of operational level dynamics, as established in this study and also by others (see Schouten and Moriarty, 2003, Mehta, 2007, Pahl-Wostl et al., 2011) still raises questions about the effectiveness of the existing nested form of water governance.

It is further argued that formal rules need to build on informal rules, especially the community's norms, in order to minimise conflict, since both seek to shape socio-economic development. For instance, at the operational levels, chiefs had their rules (taboos, norms and beliefs) to safeguard natural resources including water. As such, creating an interaction between those rules (informal rules) and formal rules will ensure harmony in rule enforcement and bring about less transaction cost (Balint et al., 2002, Behera and Engel, 2006, Saleth and Dinar, 2004, Tortajada, 2010b, Falk et al., 2009). Despite this sound argument, the existing institutional arrangements in Ghana's CBWM do not *fully* integrate informal rules (taboos, norms and beliefs). This is partly due to: (i) the nature of the water system where access is limited to the ability to pay and the technology involved in extracting water, and (ii) the creation of management structures (WSMTs) and rules at the operational levels, which are *not* under the direct influence of traditional authorities.

Despite the limited integration of the informal rules into the formal institutional arrangements, there is a link between the informal rules (norms and values) and the biophysical condition of water, in

terms of its non-excludability. For, example, the customary norm on non-excludability in access to water is still practised, although access to water from the water systems is based on ability to pay.

8.4.2 Actors of community-based water management

There are a number of actors who are expected to carry out certain actions, based on the rules, in order to produce outcomes. The empirical literature (see section 2.4.1) and the institutional analysis in the four cases (see section 7.3) show that the process of constituting the WSMTs are similar, especially in sub-Saharan Africa, although implementation differs. For instance, the empirical literature shows that some operational level management bodies are elected through political procedures (simple majority vote) (Christina et al., 2013) and others are appointed by community elders (Schouten and Moriarty, 2003, Eguavoen, 2007, Manyena et al., 2008). In the study area, the boundary rules require that in each community the WSMT members be constituted by representatives from the various sections of the community. However, the empirical results showed that they were mostly selected by sectional heads and elders. Irrespective of the mode of constituting the WSMTs, revenue mobilisation (fiscal decentralisation) and management functions (administrative decentralisation) are transferred to them: this is in line with the core tenets of decentralisation (see, for instance, Christina et al., 2013, Smoke, 2003, Rondinelli et al., 1989). However, the challenge with hand picking WSMT members is that it compromises accountability because the WSMT members tend to believe that they are not accountable to the general public (Manyena et al., 2008).

In terms of relationship among the actors, the institutional analysis demonstrates that from the operational level through to the regulatory and national levels, the actors are nested and such an institutional arrangement has potential benefits in resource management (see Mansbridge, 2014, Berkes and Ross, 2013, Ostrom et al., 1993). However, nesting is not always a closed loop structure, especially in small town water management, as demonstrated in Figure 7.1. This is because, as established in this study and by other scholars (see, for instance, Tortajada, 2010b, Madrigal et al., 2011, Villamayor-Tomas et al., 2015, Harvey and Reed, 2006a), there are other key actors, such as area mechanics and NGOs, who are not embedded in the operational and regulatory levels' decision-making arenas, but emerge, as and when necessary, to provide services or complement the functions of the mainstream actors.

Therefore, the presence of actors from the public sector and actors from the private sector justifies the need to *minimise* a closed form of institutional arrangement (Keast et al., 2006) in order to accommodate complementary services from the private sector. The presence of actors that are outside the mainstream decision-making arenas does not reject the relevance of nesting. Despite

the implementation challenges (which are caused by the stressors in Figure 8.1), nesting is *still* relevant in order to regulate, coerce or impose sanctions where necessary to ensure that the water system is managed appropriately. It also provides impetus to the decentralised system of resource management, where government's role is still relevant, as also emphasised by many scholars (see, for instance, Mansbridge, 2014, Schwartz, 2008, Brown et al., 2012, Laban, 2007, De, 2009, Jiménez and Pérez-Foguet, 2010, Opare, 2011), as explained in section 3.3. Moreover, nesting promotes the adaptive capacity of actors because the weaknesses, especially capacity, at one level, especially the operational level, are offset by the regulatory level (Smit and Wandel, 2006, Saravanan, 2008, Rammel et al., 2007, De, 2009, Robinson and Berkes, 2011).

The institutional arrangements for CBWM recognise and provide for regular complementary functions to the operational level to promote their capacity to anticipate and respond to water management challenges. Such an institutional arrangement is expected to promote proactive adaptive capacity (Hill and Engle, 2013). Complementary functions, especially of the regulators, are clearly defined and legally established in Ghana unlike in other jurisdictions (see, for example, Christina et al., 2013, Schouten and Moriarty, 2003), where there are no clearly defined roles of the key actors, leading to performance lapses in CBWM. For example, in Ghana, the capacity building of operational level staff comes from the District Assemblies and the CWSA (CWSA, 2007a, CWSA, 2014d). Although the functions and obligations are institutionalised, the empirical data in this study shows that the actual functions carried out by the actors, from the operational level to the regulatory level, to a large extent, deviate from the legally documented ones. Thus, while actors' actions are expected to be informed by the rules, in practice, they sometimes work contrary to the rules, and the presence of the stressors limits the enforcement of the pay-off rules, especially sanctions.

The preceding discussions show that while rules are necessary for cementing actors in CBWM, they do not directly translate into good outcomes, as the theory of decentralised community-based management anticipated (see Evans and Appleton, 1993, Asthana, 2012, Blaikie, 2006). The rules are comprehensive within the institutional set up of small town water systems, which can enable the water systems to function but they are barely adhered. Therefore, while inadequate institutional provision for scope, choice and pay-off rules led to inefficient water management in other jurisdictions (see Bettini and Brown, 2011, Christina et al., 2013, Manyena et al., 2008), performance lapses as established in this study relate to non-compliance with rules. More importantly, in CBWM, the institutional arrangements should be able to adapt to changes with the action situation but such an adaptation is also constrained by the embedded stressors. This raises

key questions about the role of the institutional arrangements in shaping the expected benefits of CBWM, which motivated its widespread adoption by several countries and donors.

8.5 Linking the institutional arrangements to the performance of CBWM

The discussions on the performance of the water systems and the institutional arrangements lead to the third research question: how do the institutional arrangements and the existing practices of CBWM shape the performance of the water systems? This research question draws on the preceding two sections, taking into account the expected performance outcomes (theorised benefits) of community-based management. For emphasis, the theoretical argument of CBWM is that communities, as compared to other actors, are closest to the resource and, as such, transferring authority, responsibility and control over resources to them, as well as creating a sense of ownership in them, will lead to an equitable, accountable and transparent management of the water systems (see, for example, McCommon et al., 1990, Doe and Khan, 2004, Blaikie, 2006, Opare, 2011, Asthana, 2012, Evans and Appleton, 1993, Mugabi and Njiru, 2006). The subsequent sections focus on the theoretical arguments in respect of (i) accountability, transparency, issues of trust and information sharing; (ii) ownership and control of water systems; and (iii) community-level cohesion. The implications of these on the ability of the CBWM approach to deliver continuous water services in small towns are discussed in section 8.5.4, the appropriateness of CBWM in small towns.

8.5.1 Accountability, transparency and issues of trust

The empirical analysis shows that in CBWM, accountability and transparency remain cross-cutting issues because they emerge in; decision-making, tariff setting, user-WSMT engagement, and financial administration. Although accountability and transparency are necessary ingredients for efficient CBWM (see Rouse, 2013, Madrigal et al., 2013, Opare, 2011), within the wider water sector, some water governance scholars (see Tortajada, 2010b) argue that the direction and approach of accountability and transparency remain uncertain (see section 3.2.2). On the contrary, as demonstrated in chapter seven, the institutional arrangements make adequate and clear provisions for accountability and transparency, which can contribute to improved performance of the water systems. However, the *implementation* of these provisions is almost absent. This is partly due to: the style of leadership, which is able to circumvent the institutional arrangements without any penalties; the entrenched socio-cultural factors (informal institutions) that limits participatory decision-making and demand for accountability; and individualism, which reinforce the lack of enforcement of pay-off rules.

It has been emphasised that too much focus on strong leadership can lead to a reduced participation of customers and accountability issues (Taylor, 2002, Madrigal et al., 2011). This is supported by the findings of this study. In some communities, leadership still takes a traditional approach, where the WSMTs (and in some cases only a few individuals within WSMTs) assume excessive central authority and take decisions (see participatory decision-making in section 6.5.2). This approach does not facilitate interactions and collaboration among actors in CBWM, as noted by others (see, for example, Saravanan, 2008, Armitage, 2005). This raises concerns about the practical relevance of CBWM in promoting accountability and participatory decision-making on the one hand, and the ability of the institutional arrangements to evolve and respond to the accountability and participatory decision-making gaps on the other.

Interestingly, from the discussions with some marginalised members of a WSMT, it was evident that the leaders can enhance internal collaboration if they (WSMTs) take a constructive role. Also, as noted by Innes and Booher (2000), taking a constructive role entails guiding the interaction of actors and giving all members, such as the operating staff, the vendors and the customers, the opportunity to deliberate on issues confronting water services delivery. This is because outcomes (successes and failures) in water governance is not and should not be attributed to an individual because it is about collective decision-making and actions (Innes and Booher, 2000, Saleth and Dinar, 2004). While it is argued that such a collective action enhances actors' ability to anticipate and respond to stresses within the water system (Armitage, 2005), it is lacking in the communities; implying that CBWM approach does not automatically translate into collective decisions and actions. The empirical evidence in this study shows that this can only happen when the leadership appreciates and embraces collective decision and action in CBWM. The household surveys and the focus group discussions show that customers are already craving for such an approach, as demonstrated during the mobilisation stage of the water projects, implying that when leadership adopt such an approach, it can lead to better outcomes, as established in small towns in southern Ghana (Opare, 2011). The enthusiasm of community members during the resource mobilisation stage for the water project and the current desire for participatory decision-making suggest that collective action has prospects, if it is given the needed attention.

It is interesting to note that, while the WSMTs do not account for their actions to the customers (downward accountability) and to the regulatory level (upward accountability), the demand for accountability by both the customers and sometimes the regulatory level have been ad-hoc and often triggered by the existence of water problems. Thus, management of the water systems are more reactive to challenges, confirming what Hill and Engle (2013:180) described as "crisis management mentality", sometimes leading to the long downtime of water systems during a

breakdown. Additionally, the lack of regular demand for accountability from the WSMTs by customers is constrained by socio-cultural factors (see discussion in sections 7.5.2 and 8.2.1). Similarly, Ballet et al. (2007) observed that there are tensions between the demands for accountability in resource management regimes and the existing socio-cultural norms. That is, the institutional arrangements require water managers to render accounts to customers; when they fail to render accounts, customers can demand accountability from managers. However, demand for accountability is constrained by traditional powers and social bonding, which are defined by culture and customs of the area (see Madrigal et al., 2013, Ballet et al., 2007). In other words, participatory water management, such as CBWM, requires customers to have a greater stake, what Ballet et al. (2007:362) termed as "equal rights". However, the traditional power structure does not promote equal decision-making rights (Ballet et al., 2007) or rights of customers to demand accountability from elders, some of whom are water managers. As such, accountability concerns are mostly found during the operation and maintenance stages of the water systems.

The field findings during construction, operation and maintenance of water systems support the argument by Tortajada (2010a) that accountability is less emphasised during the operation and maintenance stage, leading to mismanagement and loss of revenue. For instance, one would have expected that the high tariff levels in relation to the urban areas in Ghana and elsewhere (see Gbedemah, 2010, Neef, 2009) would yield and maintain high revenue. However, substantial revenue is lost in these communities as a result of lack of accountability and transparency, emphasising the argument that while revenue generation is important in water management (Biswas and Tortajada, 2010, Maras, 2004), accountability and transparency in revenue management are equally important in creating trust and ensuring continued payment for water services (see Rouse, 2013, Milman and Short, 2008, Prokopy, 2005, Opare, 2011, Manyena et al., 2008, Serageldin, 1995).

Although there were no reported cases of households not paying water because of lack of accountability, the study established that a lack of accountability is creating mistrust of management staff and, in the long run, it can affect the payment of bills. For example, as demonstrated in section 6.4.3, a greater proportion of the household respondents, especially in Daffiama and Gwollu, do not trust the water managers and they attribute it to proven misappropriation of water revenue, and deficiency in transparency and accountability, especially of water revenue. Therefore, it can be argued that although decentralised water management sought to minimise corrupt practices, especially by state officials (see, for example, Ostrom et al., 1993, Jiménez and Pérez-Foguet, 2010), it ended up creating corruption at the local levels ("decentralised corruption").

From the four cases, it has been found that team work creates more trust than individual-based actions. For example, in Busa, there are simultaneous efforts among individual management staff members to build trust and work effectively in their respective roles so that there is no apportioning of blame on failures. With team work, the WSMT in Busa was able to avert a non-water related problem (see section 7.5.2) from creeping into water management. However, in the other communities it was found that there is limited trust even among WSMT members and operating staff because there were reported cases of some members/staff diverting water revenue and violating the CBWM rules for personal gains. Mistrust among management staff of the same water system potentially overrides team work and this ultimately affects the management activities. The trust issues among management staff and between management staff and water customers are partly attributed to lack of information sharing, especially on water revenue and billing methods, and a lack of practical transparent decision-making arenas at the operational level.

As rightly noted, the threads that knit accountability, transparency and trust are information and knowledge sharing (Saravanan, 2008, Tortajada, 2010b, Madrigal et al., 2013), justifying the need for information rules in CBWM. While monitoring and information sharing are identified as key requirements in adaptive capacity in water resource management (Gupta et al., 2010, da Silveira and Richards, 2013, Pahl-Wostl, 2008, Rouse, 2013, Porter and Córdoba, 2009, De, 2009), this study established that there are weak monitoring and information sharing within and across levels, despite the presence of information rules. The absence of information sharing leaves customers uninformed of the CBWM activities around, leading to problems of mistrust. This challenges the assumption that community members have the needed knowledge of each other and the water resources to promote CBWM.

The significance of information in resource management is supported by the desire of community members to access reliable information about the water systems. Unfortunately, information sharing at the operational levels is “unidirectional”. Management staff disseminate information about decisions taken, especially on the tariffs’ structure, to the customers. There is no avenue for customers to contribute toward decision-making or, at least, to know how the water revenue is expensed. Thus, customers are side-lined in decision-making, which can be a source of conflict in CBWM. The role of power asymmetries between government officials and water managers, social bonding and traditional powers (cultural) in supressing accountability also raises concerns about who has “ownership” and “control” over the water systems.

8.5.2 The rhetoric of ownership and control in CBWM

As part of the CBWM principles, the communities' contribution towards capital cost is aimed at inculcating community ownership. Similar to what has been established by others (see Marks and Davis, 2012, Gbedemah, 2010, Doe and Khan, 2004), households in this study associated community ownership with their contribution towards the capital cost, although according to the CWSA staff, contribution to capital cost is a policy orientation, which seeks to actively integrate communities into the water projects to take responsibility for their maintenance. Beyond community contribution, households also linked ownership to the water systems being managed by community members who take decisions about the water system while others attributed community ownership to the location of the water systems: simply because the water system is located in their community it belongs to the community. Although ownership has a legal connotation, as indicated by Williamson (1993), no household respondent was able to relate community ownership to legal ownership and this is partly due to their level of education: the majority of respondents do not have formal education and/or higher education. Nonetheless, as established also by Schouten and Moriarty (2003) and Cleaver and Toner (2006), communities have no legal ownership of the water systems. Despite the fact that a greater portion of the customers and all the management staff indicate that their respective communities "own" the water systems, legal ownership is vested in the District Assemblies and the communities hold and manage the water systems on behalf of, and in trust for, the District Assemblies.

Although communities have no legal ownership of the water systems, they are expected (legally) to *control* the functioning of the water systems. The control element in CBWM is expected to be all encompassing, including taking decisions and actions on tariff setting, extension of pipe lines, composition of water management organisation, and disconnection of defaulters of water bills. These are appropriately entrenched in the CBWM rules (see Table 7.2). For example, the presence of rules on disconnections of water supply is appropriate because it seeks to ensure financial sustainability, which is necessary for the functioning of the water systems. However, in instances where government departments and staff are the defaulters, there are limits to which control, as emphasised in CBWM (McCommon et al., 1990, Evans and Appleton, 1993, Doe and Khan, 2004), can be applied, because the status of such defaulters makes it difficult for managers to enforce the legal provision in respect of services delivery.

Additionally, the WSMTs are expected to have authority and responsibility on all public water supplies within their jurisdictions. Empirically, some NGOs in the past supplied water services to communities without reference to the local government authorities (Moriarty et al., 2013) and this has had associated oversight responsibility challenges over such facilities. The findings in this

study show that NGOs essentially work with local government authorities (District Assemblies) to identify beneficiary communities. However, some individuals, especially politicians who are seeking (re) election, mostly supply water facilities (boreholes with hand pumps) without reference to the procedures of the Districts, making it difficult for WSMTs to take control over the management of such water facilities. Since access to water from such facilities is not regulated by the WSMTs, it limits effective demand for water from the water systems, leading to low revenue.

8.5.3 Community level cohesion

One of the arguments for CBWM is that there is strong community cohesion, which is necessary for the functioning of the water systems (see Bakker, 2008, Blaikie, 2006, Isham and Kähkönen, 2002b), although there are varying degrees of conflicts within the communities that are directly or indirectly related to CBWM. It has been argued that at the local and the national levels, conflicts do not necessarily arise from lack of water but the manner in which it is governed (see, for example, Bakker, 2007, Wolf et al., 2005, Saravanan, 2008). This argument is somewhat supported by this study because the concerns of customers also include the lack of information on water revenue usage, billing methods and the rationale for water shortage anytime it occurs. In principle, while the customers' concerns are addressed by the institutional arrangements, and the role of the state in facilitating information sharing to address these concerns has been emphasised (see Mansbridge, 2014, Brown et al., 2012, Opare, 2011), the implementation remains a challenge.

It is also argued that conflict is not entirely negative because it can lead to institutional changes, which promotes a deeper analysis of the problems and ultimately enhances decision-making (Ebbin, 2009). But this may not hold in all situations, especially where the institutional arrangements are not able to evolve and respond to the causes of the conflicts. For example, conflict between two clans negatively affected CBWM in Kenya (Schouten and Moriarty, 2003), as demonstrated in chapter three. As such, depending on the nature and strategies used to manage conflict, it can be a source of self-organisation in a water resource system or a hindrance. The situation in the study area is that water-related conflicts rather reduced the enthusiasm among some management staff, and consequently affected daily management activities (see section 7.5.2). Unlike the situation in Kenya, conflicts in the study areas are not related to clans, although there are different clans in each community. Instead, conflicts among staff are related to financial misappropriation, usurpation of roles, and limited collective decisions and actions (analysed in section 7.5.2).

Another source of conflict in water management is politics. Party politics is creeping into CBWM, and the "cosmetic" change in branding, from water and sanitation *development boards* to water

and sanitation *management teams*, substantiates it (see analysis in section 7.5.3). While party politics is not necessarily bad, the manner in which it is handled can have negative or positive ramifications in CBWM. Threatening statements which link management positions to political parties, as established in this study, support the earlier findings where political interference in management and decision-making has caused inefficiency in water management (Biswas, 2006, Schouten and Moriarty, 2003). Tensions between political groups at the operational level do not promote effective CBWM as each group seeks to outwit the other in CBWM positions. It can also lead to one group rising against another over decisions made on water management, as established in Colombia by Schouten and Moriarty (2003). Similarly, in Mexico, top water management staff are changed almost every two years (anytime there is a change in a Mayor), leading to a truncated decision implementation. The absence of a separation between water management and politics results in inefficiency in water management (Biswas, 2006). Therefore, the much anticipated community-cohesion for efficient CBWM is affected by party politics and this is likely to have future implications as party politics continue to dominate community-level activities.

As demonstrated in the preceding sections, application of the IAD framework to analyse CBWM approach using field-based evidence provides a comprehensive understanding of the approach. Although Imperial (1999) argues that the IAD framework gives an impartial analysis of the resource regime and does not judge one institutional arrangement over the other, its application, as observed in this study, is able to diagnose whether a particular institutional arrangement is appropriate for a given resource management situation (for example, CBWM in small towns).

8.5.4 Appropriateness of CBWM in small towns

The empirical literature theorises that CBWM is appropriate for rural areas, where there is relatively good community cohesion, instead of large-scale areas (see Meinzen-Dick, 2007, Blaikie, 2006, Schouten and Moriarty, 2003, Moriarty et al., 2002, Doe and Khan, 2004). Specifically, as regards CBWM in small towns, the argument is that it is difficult to establish community cohesion due their large size and they are too small to attract private utility providers (Rouse, 2013, Moriarty et al., 2002, Mugabi and Njiru, 2006, Isham and Kahkonen, 2002a). However, the above arguments are based on an analysis of CBWM in isolation and fail to recognise the relevance of polycentricity in CBWM. For emphasis, a polycentric system of governance recognises the imperfection in either decentralised community-based management or centralised resource management and calls for a balanced approach, in which it recognises and integrates the role of the state in decentralised resource management (Brown et al., 2012, Bakker and Cook, 2011, Mansbridge, 2014, Hill and Engle, 2013). Empirically, this approach has been useful in decentralised water resource management as established by several authors,

including: Neef (2009) and (Falk et al., 2009) in water management in Namibia; Schwartz (2008) in Uganda; Schouten and Moriarty (2003) in water conflict resolution in Kenya; De (2009) in water management in West Bengal; and Serageldin (1995) in irrigation management in France, as demonstrated in section 3.3.

The case studies for this thesis provide the grounds for examining such interactions, especially between operational and regulatory level structures. In relation to the arguments of a polycentric system of governance, this study established that there are well-established legitimate functions within and between the two levels; while recognising the complementary roles of other actors (outside the mainstream decision-making arenas) (see analysis of institutional arrangements in section 7.2 above) and providing for accountability, control over the water systems, participatory decision making, and collaboration (see details in section 6.5). Although such institutional arrangements have prospects, the implementation challenges, which are caused by the abovementioned stressors (see Figure 8.1), counteract the core tenets of CBWM.

Despite the implementation challenges, a greater proportion of the household respondents (see section 7.6) view CBWM as appropriate and this is attributed to the availability of water. However some, who indicated that CBWM is inappropriate, have concerns relating to a lack of accountability and transparency in their respective communities, a lack of participatory decision-making, and favouritism that is rooted in social bonds. The declared institutional arrangements (see, for instance, section 7.2) make provision to address these concerns. However, as discussed in the previous sections, there are implementation challenges, which are not related to the *size/population* of the communities as being argued in the literature (see, for example, Schouten and Moriarty, 2003, Doe and Khan, 2004, Isham and Kahkonen, 2002a).

Specifically, a lack of cohesion, as argued by others (see Rouse, 2013, Moriarty et al., 2002, Mugabi and Njiru, 2006, Doe and Khan, 2004), although existing in these communities, is not related to the scale or extent of urbanisation of small towns. This is because lack of cohesion cuts across the small towns, although they have different population size (see Table 5.4). Instead, the lack of cohesion is due to strong social bonding within small units (families and clans) and the creeping in of party politics in CBWM in some communities. That is, there are strong ties within families and clans, resulting in preferential treatment in water services delivery within those units and lack of will-power to enforce specific rules. Moreover, the problems associated with the non-payment of bills, political interference and fraudulent activities in small town water systems in Ghana are also found in urban water management (see, for example, Biswas, 2006, Rouse, 2013,

Biswas and Tortajada, 2010). Therefore, it is not about CBWM not being appropriate in small towns but all actors working according to the institutional arrangements.

In addition to the concerns about community cohesion, some researchers (see, for example, Manyena et al., 2008, Harvey and Reed, 2006a, Maras, 2004) questioned the relevance of CBWM in poor regions: ability of communities to mobilise funds and necessary technical skills to deliver water services. However, based on the empirical findings of this study, it is argued that the relevance of CBWM goes beyond poverty and community-level cohesion: the socio-cultural norms, opportunism (desire for personal gains) and power asymmetries, which constrain interaction within the institutional arrangements remain critical and under explored in CBWM. These factors serve as stressors on the pattern of interactions within the institutional arrangements for CBWM and further constrain the ability of institutional arrangements from evolving to address them. Therefore, while there is the need to emphasise cohesion and capacity, this study maintains that CBWM remains ineffective unless the actors, especially the operational and the regulatory levels, have the self-control and willingness to integrate users in decision-making arenas as well as the willingness and commitment to carry out their functions.

The findings of this study support other scholars (see Meinzen-Dick, 2007, Bakker, 2008) who argue that the challenge is not with changing the management models, that is, moving from municipal management, community-based water management to a private operator-led management. Instead, it is about a carefully designed institutional arrangement involving the customers, and, more importantly, the various actors within a particular management model, such as CBWM, working according to the institutional arrangements that constitute the management model. This further raises questions on the functioning of a polycentric system of governance, where the functions of the state and other non-community-based actors are emphasised.

8.5.5 Reiterating the critical role of the state and other actors in CBWM

It is worth emphasising that despite the transfer of control, authority, responsibility, and "quasi-ownership" to communities, the facilitative roles of the state, through its decentralised departments, and/or some other third party (for example the private sector or civil society) remain imperative. Government's retention of legal ownership coupled with the above stressors highlight the critical role of government in a decentralised natural resource management, especially water, and several scholars have also established this (see, for instance, Neef, 2009, Rouse, 2013, Moriarty et al., 2013, Schwartz, 2008, Mansbridge, 2014, De, 2009, Robinson and Berkes, 2011, Schouten and Moriarty, 2003). Additionally, water remains a necessity and the call for governments not to shirk their responsibility in facilitating communities to continuously attain this basic necessity, as

stressed by Harvey and Reed (2006a), should be emphasised. In other jurisdictions, governments played a facilitative role in minimising these stressors (see, for example, Neef, 2009, Schouten and Moriarty, 2003, Opare, 2011, Falk et al., 2009), and the fact that the institutional arrangements for CBWM provide for facilitation and control by the regulatory levels serve as an opportunity to minimise some of the stressors.

Ironically, the empirical findings (see section 6.3.2) show that there are instances where the regulator (District Assemblies) default on payments and actors at the operational level are constrained in enforcing payments, especially through disconnection of their water supplies. Therefore, in situations where government departments are not responsive to their legitimately assigned responsibilities and further default on payment of water bills, as established in the study and elsewhere (see Sara and Katz, 1997, Bardhan and Mookherjee, 2006, Biswas and Tortajada, 2010, Gbedemah, 2010), private organisations, civil associations and the media can intervene and advocate on behalf of the operational level. The media, especially the local radio stations, has become a major player in carrying out the voices of consumers on water management to other actors that are above the operational levels (see section 6.5.3). While the significance of non-water related organisations in supporting water management is recognised (see Madrigal et al., 2013, Kahkönen, 1999), the emerging role of the media in promoting accountability and rule enforcement is worth exploring.

The relevance of multiple stakeholders in resources management has resulted in an increasing use of platforms for networking and innovations. In natural resource management, in particular, the platforms are meant to draw multiple stakeholders together to exchange knowledge and resources and collectively take practical actions aimed at solving common problems in order to achieve the desired outcomes (see, for example, Cullen et al., 2014, Swaans et al., 2013, Steins and Edwards, 1999). The platforms can have several benefits, especially in community-based resource management. Although distribution of power among actors can shape the processes of such platforms, the platforms are equally potential sources of minimising power asymmetries and promoting participation in decision-making processes, as established in this study (see sections 5.2.5 and 8.2.2) (see also Cullen et al., 2014, Swaans et al., 2013). Additionally, the lack of coordination and interaction, as established in this study, can be addressed through such platforms.

Despite the significance of platforms, it is important to note that their success depends on the attitude, skills and capacities of the members of the platforms, especially the facilitators of the platforms' processes, the relationship between the stakeholders, and the extent to which the

platforms are formally institutionalised (Steins and Edwards, 1999, Swaans et al., 2013). This implies that the limited capacity and commitment, as establish in this study (see section 8.2.1), needs to be recognised and explicitly managed.

8.6 Recommendations of the study

Based on the research findings, there are water resources management recommendations that are worth considering.

Creation of platforms for interaction and learning: The outcome of the regional focus group discussion shows that such a platform for interaction is feasible and useful for actors to meet and share knowledge of CBWM. Hence, organising annual platforms to discuss the progress of the water systems is an important learning platform for water managers at the operational levels, which is worth institutionalising by practitioners/policy makers. Institutionalisation of such platforms will also urge the water managers to carry out their functions effectively since they will be required to present the status of the water systems. However, due to the usual "lack of fund" syndrome by government departments, the operational levels can *contribute* towards financing such platforms. This means that institutionalising such a platform requires the active involvement of all actors across the levels to enable them to buy into the platforms.

Water service audit: The empirical evidence of this study has implications for the institutionalisation of water services audits, within which a financial audit is a component. This is a holistic audit of all components of the water systems. Such an audit will help actors, especially the regulatory level actors, to identify and tackle stressors that are capable of pushing the water systems into an undesirable state. This kind of audit will also ensure that operational level staff do not overstay their tenure of office.

Information generation and reporting: In CBWM, generation and management of reliable information are important and the actors need to engage seriously in information sharing processes as enshrined in the rules. This can be facilitated by regular monitoring from the regulatory level and well-established bodies, including the private sector and civil associations. This should be accompanied with a good reporting structure. A robust water sector information system for monitoring and evaluation water systems is required to complement the proposed water service audit. This will help improve communication within and across levels and keep all actors well-informed of how the water systems are managed. Therefore, implementation of the information rules remains critical and a strong policy direction is required in that respect.

Moreover, monitoring the activities of the districts needs to be redefined in terms of scope and go beyond the so-called quarterly and annual reports, generated at the regulatory levels and to sample reports from the operational level for validation. This will ensure that water managers and the District Assemblies live up to expectations. Relying on reports of government units as a way of checking the regulatory levels' commitment to water management as evidence of accountability is good but not enough evidence of the reality and, as such, sporadic operational level monitoring is necessary. Therefore, donors need to pay attention to on-going functioning of the institutional arrangements for CBWM, through periodic post-construction evaluation, in order to inform future projects design and implementation.

Capacity building and user-engagement: Although field-based internship for operating staff is good, it is important that subsequent new water systems integrate a formal structure of training for the operating staff. For the users, it is important to build user-knowledge, through information sharing to enable them participate and hold operational level staff accountable. An effective approach to disseminating CBWM rules, functions and expectation of each actor is required and this can be done by using the existing public gathering places and the media, which have proved to be effective in these communities. Beyond the general engagement with users, women are key actors of domestic water supply and, as such, integrating women into operational level water management decision-making process can serve a dual purpose: empowering them in decision-making process and bringing the concerns of women into CBWM. Achieving this requires moving beyond adding women to the list of water managers in order to meet project and constitutional requirements to ensuring that women remain functional in the on-going operation and maintenance decision-making arenas.

Coordination of water activities: It has been established that the DWST members are core staff of different units of the District Assembly and, as a result, the DWST Coordinators' positions are secondary. In order to ensure a well-coordinated water sector in each district, it is important to establish a Water and Sanitation Unit with core staff whose primary duty is to plan and implement water and sanitation related activities and report to the District Assembly and the CWSA. This will minimise the adverse effects of the frequent transfer of local government staff on the activities of the water sector.

Introduction of lifeline rates: Given that women are the main payees of water, policies to ameliorate the financial burden on them is worth exploring. Hence, an introduction of lifeline rate is recommended for the water systems to: (i) serve as an incentive for water conservation, especially among large users of water; and (ii) minimise the burden of any further increase in tariff

on households, especially the poor and women. Lifeline rates will also serve as a deterrent to indoor tap users who engage in internal black marketing of water as well as those who connect water for domestic purpose and later use it for commercial while they are still billed on the domestic rate.

Recommendations for future research: Based on the findings of the research, some potential areas have been identified for further research. There are calls for private sector participation in water management in small towns. As such, public-private partnership requires a critical analysis, and it should focus on an analysis of the institutional arrangements (contractual agreements) and the performance outcomes. Hence, there is the need to further extend the IAD framework to specifically analyse the relationship between the government, the communities and the private sector in the management of water systems. The outcomes of such an analysis will inform future public-private partnerships in the sector. Finally, this research has established the presence of strong social and cultural factors that influence the working of the institutional arrangements for CBMW. Therefore, from a sociological/anthropological approach, detailed research is required to investigate the role of social and cultural bonding in community-based management of natural resources, especially water systems.

8.7 Conclusion

This study has established that the existing institutional arrangements for CBWM are part of Ghana's overarching decentralisation policy and legal framework of devolving resource management, including water supply, to local levels. This was in line with the international community agenda, led by donors, of transferring water management in small towns and rural communities to community level management structures. Since the adoption of this management approach, several studies have been conducted to examine its performance outcomes while an analysis of the institutional arrangements remains underexplored.

This study is one of the contemporary empirical studies that took a "twofold" approach: examining the performance of the water systems and how they are influenced by their institutional arrangements. The institutional analysis revealed that *management* of small town water systems is anchored at two main levels: intra-level (within operational level) and inter-levels (between the operational level and the regulatory level). These levels have a nested form of institutional arrangements with complementary functions, making provision for corresponding services from private sector actors, portraying a polycentric model of water governance. Examination of the *designed* institutional arrangements for CBWM further suggests that they have the potential to contribute to the NCWSP objectives and the wider aim of CBWM. However, the empirical

evaluation of indicators showed that many are at variance with the intentions of the institutional arrangements. Significantly, there is a lack of accountability, transparency, and involvement of users in decision-making, leading to mistrust of water managers. Therefore, what should be de-emphasised in CBWM is what is termed as "*centralised community-based management*". This is a situation where those in management positions take all decisions regarding the development and management of the water systems without the views of the end-users. Such a management approach does not promote transparency and accountability to users and it is a recipe for conflict.

Based on the institutional analysis, it is posited that rather than arguing for "external support"', water scholars and practitioners should redirect efforts to examining the basis of non-compliance with the existing institutional arrangements, in which what they termed "*external supports"* which I termed as "*complementary functions"*, are already enshrined. They are termed complementary functions because those functions are an embedment of the institutional arrangements for CBWM: they are not subsidiary functions. Therefore, working according to the declared institutional arrangements will potentially overcome the stressors and consequently enable the water systems to adapt to future threats, including population growth.

Given that the communities have strived to maintain the functioning of the water systems with very minimal complementary functions from the regulatory levels, it then suggests that with adequate complementary functions, communities will be motivated and guided against mismanagement of the water systems. As such, rather than calling for delegated management (public-private partnership) at an infant stage[54], the focus should be on working with the existing institutional arrangements and reshaping them, which *may* later involve delegated management, as and when necessary. This is because the designed institutional arrangements in place, to a large extent, fit into the wider theoretical arguments for CBWM. However, the existing stressors are the roots of the weak performance outcomes. Despite the presence of implementation challenges in CBWM, emanating from the stressors, one can still argue that CBWM remains a significant approach to managing water in small towns because it seeks to put *communities* at the centre of water services delivery by equipping them with decision-making powers in water management. Moreover, despite the procedural lapses in operation and maintenance of the water systems, some communities have been able to *solely* manage the water systems and deliver water services, meaning that CBWM still has prospects. Therefore, in order to draw sound conclusion on CBWM, it is argued that similar studies on community-based resource management, particularly CBWM in small towns, should adopt an institutional approach, which, as demonstrated in this study, serves as a heuristic tool to unearth the embedded issues in CBWM.

[54] Quick conclusion based on cursory analysis of performance, instead of a deeper analysis of the rationale behind the performance.

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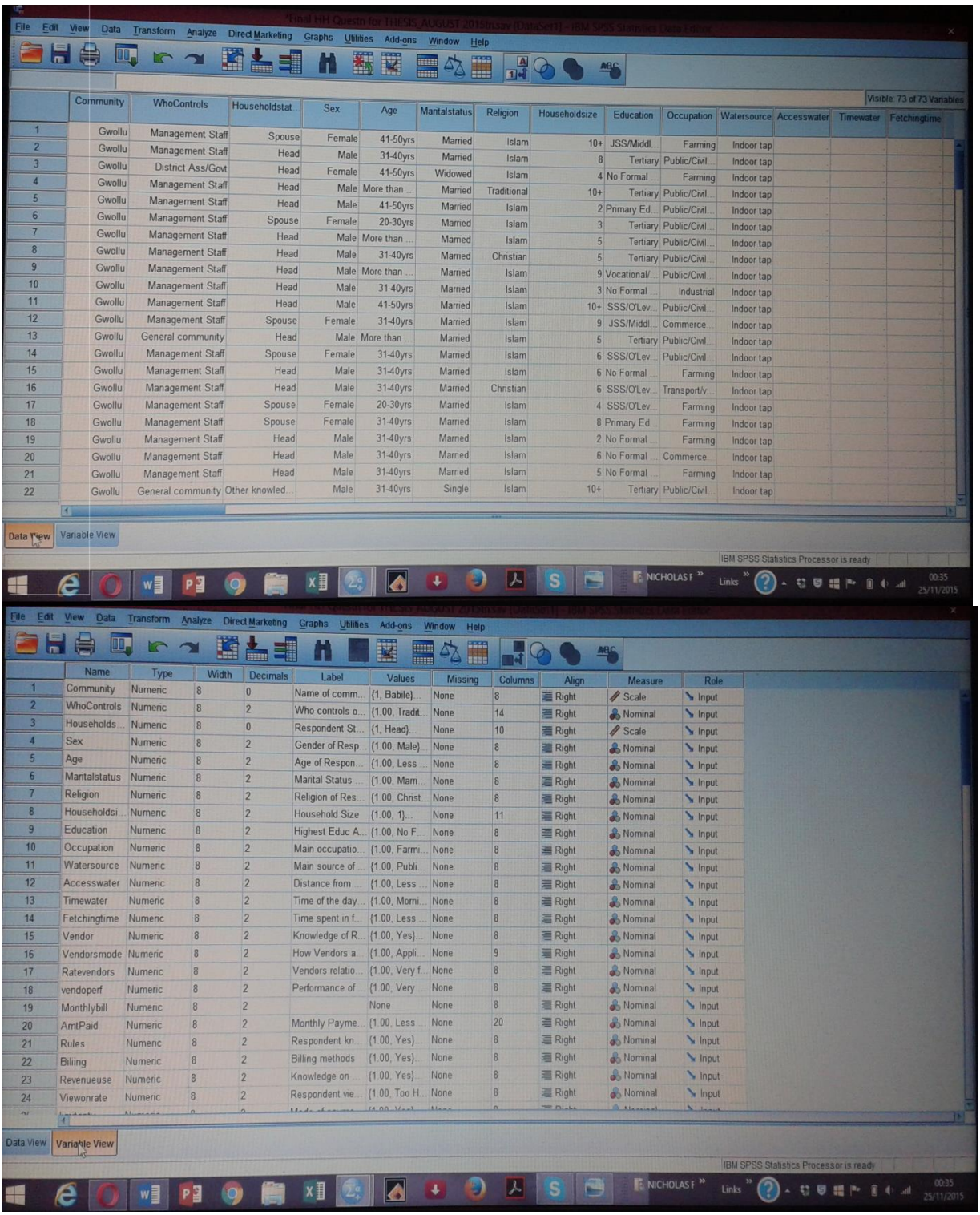
Appendix A: Performance variables and indicators of the water systems

Variables	Main Indicators
Financial and Technical efficiency	Total cost to total revenue ratio (Operating Expense Ratio).
	Staff salary (including vendors' commission) as ratio of total revenue and total expenditure.
	Revenue collection ratio (cash collected/amount billed).
	Tariff setting procedures and structure.
	Yearly auditing and documentation of records.
	Maintenance of an active replacement/reserve account.
	Operational meters (number of customers on flat rate due to faulty meters).
	Percentage of water loss.
	Existence of a working water system management and expansion plan.
	Number of operational public stand-posts.
	Observation of leakages at stand-posts, household taps, distribution lines.
	Number of household connections.
Governance (accountability, transparency, participation decision-making process).	Sectional representation in WSMTs
	User participation in decision-making about the water systems
	Gender dimension in water management.
	User access to management information (financial and annual/quarterly reports).
	User knowledge of finances of the water system.
water reliability, quality, and pressure	Number of water quality text (laboratory-based) in a year.
	Household perception of water quality, reliability and pressure of flow.
consumer satisfaction with management and service delivery	Satisfaction with operation and maintenance.
	Satisfaction with activities of management staff, including vendors.
	Satisfaction with dissemination of information about water system.

Source: Author's construct, 2013

Appendix B: Screen shot of SPSS data and variable views



Appendix C: Revenue and expenditure patterns of Babile and Busa

Summary of monthly revenue and expenditure pattern in Babile: 2011-2013 (Gh¢)

Month	2011		2012		2013	
	Revenue	Expenditure	Revenue	Expenditure	Revenue	Expenditure
January	433.50	592.65	674.41	593.66	2,560.60	945.19
February	483.35	623.35	2,921.29	612.20	960.80	888.22
March	699.31	665.28	4,086.55	880.43	1,102.10	237.32
April	859.93	574.56	536.62	583.38	741.80	29.37
May	655.93	467.83	231.38	2,232.05	1,381.40	1,503.84
June	656.68	650.51	-	515.65	2,668.40	2,297.51
July	329.31	541.74	70.00	1,441.19	2,175.40	2,313.49
August	I58.50	579.63	70.00	532.65	1,780.60	86.94
September	113.53	611.37	876.00	603.82	1,001.00	945.50
October	121.08	587.5	385.00	510.65	959.00	2,647.72
November	356.87	1,109.83	658.00	1,281.65	483.00	647.65
December	274.87	475.25	981.50	515.90	685.20	809.54
Total	**4,984.36**	**7,479.50**	**11,490.75**	**10,303.20**	**16,499.30**	**13,352.29**

Summary of monthly revenue and expenditure pattern in Busa: 2011-2013 (Gh¢)

Months	2011		2012		2013	
	Revenue	Expenditure	Revenue	Expenditure	Revenue	Expenditure
January	1,561.00	1,439.74	2,775.90	923.00	2,155.90	1,771.77
February	1,532.00	887.43	2,924.10	1,284.01	1,302.10	1,103.80
March	1,613.50	864.75	2,797.50	859.78	1,455.00	888.26
April	1,730.00	1,035.50	2,476.10	832.88	1,822.10	662.67
May	1,436.15	1,122.77	2,648.20	1,113.34	2,161.00	685.30
June	1,289.25	782.76	1,691.50	798.86	1,788.80	2,022.57
July	971.70	1,048.69	1,133.60	1,044.52	2,595.73	990.58
August	905.55	824.41	1,685.80	1,111.72	1,480.50	672.50
September	848.70	413.34	926.30	891.44	827.70	637.54
October	1,136.40	1,311.70	1,244.90	730.04	1,269.40	649.10
November	2,660.18	1,037.42	2,122.10	1,294.00	2,332.10	730.00
December	2,457.70	575.75	2,126.20	1,526.36	1,902.90	920.29
Total	**18,142.13**	**11,344.30**	**24,552.20**	**12,410.00**	**21,093.23**	**11,734.38**

Components of monthly revenue in Babile: 2011-2012 (Gh¢)

Months	2011	2012					
	Stand-posts	Private connection	Connection fees	Stand-posts	Sales of forms	Commercial connection	Total
January	433.50			424.41	250.00		**674.41**
February	483.35		2,310.00	486.29	125.00		**2,921.29**
March	699.31		3,500.00	406.55	180.00		**4,086.55**
April	859.93		280.00	251.62	5.00		**536.62**
May	655.93		70.00	161.38			**231.38**
June	656.68						
July	329.31		70.00				**70.00**
August	I58.50		70.00				**70.00**
September	113.53	516.00	350.00		10.00		**876.00**
October	121.08	385.00					**385.00**
November	356.87	578.00				80.00	**658.00**
December	274.87	941.50		35.00	5.00		**981.50**
Total	**4,984.36**	**2,420.50**	**6,650.00**	**1,765.25**	**575.00**	**80.00**	**11,490.75**

Components of monthly revenue in Babile: 2013 (Gh¢)

Months	Private connection	Connection fees	Stand-posts	Sales of forms	Commercial connection	Institution	Total
January	2,354.00		156.60		50.00		**2,560.60**
February	876.00	10.00	74.80				**960.80**
March	982.00		106.60		13.50		**1,102.10**
April	528. 00		195.80		18.00		**741.80**
May	1,294.00	10.00	47.40		30.00		**1,381.40**
June	2,364.00	100.00	59.40	5.00	40.00	100.00	**2,668.40**
July	772.00	510.00	105.40	20.00		768.00	**2,175.40**
August	1,261.00	300.00	59.60		60.00	100.00	**1,780.60**
September	1,001.00						**1,001.00**
October	609.00	310.00		20.00		20.00	**959.00**
November	198.00	105.00	180.00				**483.00**
December	510.00	10.00	165.20				**685.20**
Total	**12,749.00**	**1,355.00**	**1,150.80**	**45.00**	**211.50**	**988.00**	**16,499.30**

Components of monthly expenditure in Babile: 2011 (Gh¢)

Months	Staff salary	Vendors allowance	WSMT	VRA bills	Photo-copying	Transporta-tion cost	Repairs (services)	TOTAL
January	440.50	92.15		60.00				**592.65**
February	440.50	91.85		86.00		5.00		**623.35**
March	364.50	104.78		140.00	1.00	15.00	40.00	**665.28**
April	364.50	129.06		81.00				**574.56**
May	364.50	98.33				5.00		**467.83**
June	361.00	98.51		146.00		5.00	40.00	**650.51**
July	361.00	46.74		124.00		10.00		**541.74**
August	361.00	23.63		190.00		5.00		**579.63**
September	437.00	16.37	18.00	135.00		5.00		**611.37**
October	437.00	16.50		134.00				**587.5**
November	437.00	35.23	20.00	613.00	4.60			**1,109.83**
December	437.00	38.25						**475.25**
Total	**4,805.50**	**791.40**	**38.00**	**1,709.00**	**5.60**	**50.00**	**80.00**	**7,479.50**

Components of monthly expenditure in Babile: 2012 (Gh¢)

Months	Staff salary	Vendors allowance	WSMT	VRA Bills	SSNIT	Photo-copying	Transpor-tation cost	Repairs (services)	TOTAL
January	500.65	62.01	26.00			5.00			**593.66**
February	500.65	75.55	26.00			2.00	8.00		**612.20**
March	500.65	60.98	23.8	100.00		5.00	16.00	174.00	**880.43**
April	500.65	37.73				6.00	39.00		**583.38**
May	500.65	24.20	8.00		1,691.20	8.00			**2,232.05**
June	500.65						15.00		**515.65**
July	500.65			379.39	532.15	8.00	21.00		**1,441.19**
August	500.65	22.00					10.00		**532.65**
September	500.65				93.17		10.00		**603.82**
October	500.65						10.00		**510.65**
November	500.65			300.00	411.00		70.00		**1,281.65**
December	500.65	5.25						10.00	**515.90**
Total	**6,007.80**	**265.72**	**105.80**	**779.39**	**2,727.52**	**34.00**	**199.00**	**184.00**	**10,303.23**

Net monthly salary of operating staff as at March 2014 (GH¢)

Position	Babile	Busa	Gwollu	Daffiama
System manager	85.00	120.00	40.00	100.00
Operator	66.00	90.00	100.00	100.00
Accountant	76.00	100.00	-	-
Plumber	66.00	-	-	-
Revenue collector	56.00	-	-	-
Security officer	47.00	-	30.00	-

Components of monthly expenditure in Babile: 2013 (Gh¢)

Months	Staff salary	Vendors allowance	WSMT	VRA Bills	SSNIT	Photo-copying	Transpor-tation cost	Repairs (services)	Total
January		23.49			655.20			266.50	945.19
February		11.22		735.00				142.00	888.22
March		25.32	48.00		134.00	30.00			237.32
April		29.37							29.37
May	500.65	35.19		529.00	391.00	15.00	15.00	18.00	1,503.84
June	2,002.60	8.91	22.00		139.50			112.00	2,297.51
July	916.25	15.84	16.00	497.00	152.40	35.00	12.50	681.00	2,313.49
August		8.94						78.00	86.94
September	434.50		12.00	400.00			15.00	84.00	945.50
October	434.50				447.72	5.00	50.00	1,710.50	2,647.72
November	500.65	27.00				35.00		85.00	647.65
December	500.65	48.89	35.00			48.00	45.00	132.00	809.54
Total	**5,289.80**	**234.17**	**133.00**	**2,161.00**	**1,919.82**	**168.00**	**137.50**	**3,309.00**	**13,352.29**

Components of monthly expenditure in Busa: 2011 (Gh¢)

Month	VRA bill	Staff salary	WSMT allowance	Office impress	General O&M	Vendors commission	Total Expend.	Total Revenue
January	657.00	280.00	240.00	50.0		212.74	**1,439.74**	**1,561.00**
February	312.00	280.00	45.00	50.00		200.43	**887.43**	**1,532.00**
March	307.00	280.00	50.00	50.00		177.75	**864.75**	**1,613.50**
April	485.00	280.00	55.00	50.00		165.50	**1,035.5**	**1,730.00**
May	657.00	280.00		50.00		135.77	**1,122.77**	**1,436.15**
June	321.00	280.00	30.00	50.00	10.50	91.26	**782.76**	**1,289.25**
July	614.00	280.00	35.00	50.00		69.69	**1,048.69**	**971.70**
August	352.00	280.00		50.00		142.41	**824.41**	**905.55**
September		280.00		50.00		83.34	**413.34**	**848.70**
October	723.00	280.00	140.00	50.00		118.70	**1311.7**	**1,136.40**
November	468.00	280.00		50.00		239.42	**1,037.42**	**2,660.18**
December		280.00		50.00		245.75	**575.75**	**2,457.70**
Total	**4,896.00**	**3,360.00**	**595.00**	**600.00**	**10.50**	**1,882.76**	**11,344.30**	**18,142.13**

Monthly expenditure of Busa water system: 2012 (Gh¢)

Month	VRA bill	Staff salary	WSMT allowance	Office impress	O&M	Misc.	Vendors' commission	Total Expend.	Total Revenue
January		280.00	300.00	50.00		15.00	278.00	**923.00**	**2,775.90**
February	665.00	280.00		50.00			289.01	**1,284.01**	**2,924.10**
March	209.00	280.00	55.00	50.00		14.00	251.78	**859.78**	**2,797.50**
April	224.00	280.00		50.00			278.88	**832.88**	**2,476.10**
May	275.00	280.00	40.00	50.00	13.00	217.00	238.34	**1,113.34**	**2,648.20**
June	225.00	280.00	45.00	50.00			198.86	**798.86**	**1,691.50**
July		280.00	545.00	50.00	40.00		129.52	**1,044.52**	**1,133.60**
August	177.00	430.00	275.00	50.00	28.00		151.72	**1,111.72**	**1,685.80**
September	185.00	430.00		50.00		125.00	101.44	**891.44**	**926.30**
October	138.00	430.00		50.00			112.04	**730.04**	**1,244.90**
November	107.00	430.00	450.00	50.00			257.00	**1,294.00**	**2,122.10**
December	165.00	430.00	690.00	50.00			191.36	**1,526.36**	**2,126.20**
Total	**2,370.00**	**4,110.00**	**2,400.00**	**600.00**	**81.00**	**371.00**	**2,477.95**	**12,410.00**	**24,552.20**

GH200 donation by WSMT to Busa central mosque. GH500 as bonus for WSMT members in July.

Monthly revenue and expenditure of Busa water system: 2013 (Gh¢)

Month	VRA bill	Staff salary	WSMT sitting allowance	Office impress	General (O&M)	Vendors commission	Total Expend.	Total Revenue
January		430.00	150.00	50.00	879.00	262.77	**1,771.77**	**2,155.90**
February	468.00	430.00		50.00		155.80	**1103.8**	**1,302.10**
March	238.00	430.00		50.00		170.26	**888.26**	**1,455.00**
April		430.00		50.00		182.67	**662.67**	**1,822.10**
May		430.00		50.00		205.30	**685.30**	**2,161.00**
June	1,274.00	430.00	90.00	50.00		178.57	**2,022.57**	**1,788.80**
July	64.00	430.00	310.00	50.00		136.58	**990.58**	**2,595.73**
August	38.00	430.00		50.00		154.50	**672.50**	**1,480.50**
September	85.01	430.00		50.00		72.53	**637.54**	**827.70**
October	41.00	430.00		50.00		128.10	**649.10**	**1,269.40**
November	7.00	430.00		50.00		243.00	**730.00**	**2,332.10**
December		430.00	250.00	50.00		190.29	**920.29**	**1,902.90**
Total	**2,215.01**	**5,160.00**	**800.00**	**600.00**	**879.00**	**2,080.37**	**11.734.38**	**21,093.23**

**GH600.00 for 4inch valve, Gh40.00 for PVC flamp adaptor and GH160.00 for services/workmanship. This was in January 2013 when the water system had major breakdowns. However, it was later detected that these parts were not needed but that the water meters were choked with dirt and only needed cleaning. This compelled the WSMT to be cleaning the tank/reservoir regularly.
Spraying of grass at the HLT and around office (GH¢79)
150* for the chairman.

Appendix D: Support letter for data collection

Henley Business School
UNIVERSITY OF READING

School of Real Estate & Planning
University of Reading
Henley Business School
Whiteknights

Reading RG6 6UD

phone +44 (0)118 378 6219
fax +44 (0)118 378 8172
email m.t.williams@henley.reading.ac.uk

To whom it may concern

26 March 2013

Subject: Request for support

Dear Sir

We herewith certify that Mr Nicholas Fielmua is registered at the Henley Business School, University of Reading, UK, as a research student attending a three to four years PhD course in Real Estate & Planning.
His research entitled *Sustaining small town water systems in Northern Ghana: an analysis of institutional capacity* includes fieldwork in Ghana. This study is expected to holistically analyse and unearth issues surrounding sustainability of small town water systems, especially in Northern Ghana, and the findings will contribute to the management of these systems.

Our School highly appreciates your support in providing him the necessary data and information during the stated fieldwork period.
We guarantee you that the information that would be made available to Mr Fielmua will be treated as confidential and utilized only for the research purposes. Besides, Mr Fielmua will make proper acknowledgement and reference to the source of the information in the final document.
Your cooperation is appreciated; please do not hesitate to contact me if you need further information.

Thank you.

Yours faithfully

pp Dr Gianluca Marcato
Director of Postgraduate Research Studies in Real Estate & Planning

Accredited by Association of MBAs · EFMD EQUIS ACCREDITED · AACSB ACCREDITED

Appendix E: Consent form

University of Reading

Appendix B: CONSENT FORM

Consent Form

1. I have read and had explained to me by **Nicholas Fielmua,** the accompanying Information Sheet relating to the project on: **Community management of small town water systems in North-western Ghana; An analysis of institutional adaptive capacity**

2. I have had explained to me the purposes of the project and what will be required of me, and any questions I have had have been answered to my satisfaction. I agree to the arrangements described in the Information Sheet in so far as they relate to my participation.

3. I understand that participation is entirely voluntary and that I have the right to withdraw from the discussion any time, and that this will be without detriment.

4. I agree to the interview/session being video/audio taped.

5. This application has been reviewed by the Ethics committee and has been given a favourable ethical opinion for conduct.

6. I have received a copy of this Consent Form and of the accompanying Information Sheet.

Name: ..... Ato Quansah (CWSA)

Signed: .....

Date: 08/07/14

Appendix F: List of defaulters of water bill

GWOLLU WATER BOARD

DEFAULTERS (DEBTS)

DATE	INSTITUTION	CONSUMPTION	RATE	AMOUNT GH¢
2011 - 2013	Ghana Police Station	2322 ^{m3}	0.7	1,625.40
	Police Quarters	2158 ^{m3}	0.7	1,510.60
	Pigry – MOFA	966 ^{m3}	0.7	676.20
	District Assembly	1951 ^{m3}	0.7	1,365.00
	D.C.E. Bungalow	450 ^{m3}	0.7	315.00
	District Director SWDA	Flat	0.7	218.00
	Assistant Director SWDA	130 ^{m3}	0.7	91.00
	Educational Director	365 ^{m3}	0.7	255.50
	Wuljua Primary School	425 ^{m3}	0.7	297.40
	Health Service	400 ^{m3}	0.7	280.00
	Canteen SWDA	Flat	648.00	218.00
	Clement (contractor)	540 ^{m3}	0.7	648.00
	Cuban Ur.	250 ^{m3}		175.00
	issifu Topo	328 ^{m3}		224.00
	Planner	101		70.70
	DFO	264		184.80
	Twin Quarters	Flat		33.60
	Flaslan Construction	120 ^{m3}	1.200	144.00
	GRAND TOTAL			**8,332.90**

THE CHAIRMAN
GWOLLU WATER BOARD

.....
YUSSIF ABUDU BABIA

D.C.E: District Chief Executive

DFO: District Finance Officer

MOFA: Ministry of Food and Agriculture

SWDA: Sissala West District Assembly

Appendix G: Letter from WSMT to defaulters

GWOLLU WATER AND SANITATION BOARD

Gwollu Water Board
Sissala West District Assembly
P. O. Box 99
Gwollu – U/W/R
16TH February, 2014

THE POLICE COMMANDER
SISSALA WEST DISTRICT
GWOLLU – UPPER WEST REGION
Sir,

PAYMENT OF WATER BILL

Please fined attached the above mention estimate for bills Amounting to Two thousand one hundred and Sixty four Ghana cedis fourty Ghana peswas (GH¢2,164.40.00) from your institution, from 29th July, 2007 – 30th December, 2013

Your quarters also attracted a former bill of one thousand, five hundred and ten Ghana cedis sixty Ghana peswas (GH¢1,510.60.00) from 2007 – December, 2010.

Please study and comply promptly

Thank you

SUMMARY OF BILLS

Police Station	=	*2,164.40.00*
Police Quarters	=	*1,510.60.00*
Grand total	=	**3,674.4.00**

Cc: - DCE SWDA – Gwollu
CWSA – Wa
DWST. - Gwollu

Yours faithfully

.....
Abudu Babia Issifu
(The Gwollu Wter Board Chairman)

GWOLLU WATER AND SANITATION
CHAIRMAN
DATE
DEVELOPMENT BOARD

Appendix H: WSMT response to the internal audit report

GWOLLU WATER AND SANITATION BOARD

Gwollu Water Board
Sissala West District
Assembly
P. O. Box 99
Gwollu – U/W/R
10TH November, 2011

The District Chief Executive
Sissala West District Assembly (SWDA)
Gwollu.

Dear Sir,

RESPONSE TO THE INTERNAL AUDIT REPORT
FROM JANUARY, 2010 – DECEMBER 2010, ON 27TH SEPTEMBER, 2011

The Gwollu Water Board appreciate the finding and lapses of the Water Board
The small Town Water System managed by the Gwollu Water Board, faced a lot of challenges. Some of them beard witness

1. Luck of staff
2. Low water tariff and lack of support

The water Board depends on only the water sales without support from any source
For this reason the water Board Trained an Accountant at Bolgatanga polytechnic but because of low motivation he left the job.

The water board which was to have at least the following staff could not make it.

1. System manager
2. Meter reader
3. Revenue collector
4. Two operator
5. Accountant and a security could not make it because of low motivation.

The water board will therefore need help from the District Assembly for manual and training so as to meet all the required recommendation stated in the audit report.

CONCLUSION

The water board highly appreciates the work of the internal audit which will go a long way to further improve the performance of the water board.
In terms of monitoring and managing the system

Thank you

Yours faithfully

.....

Abudu Babia Issifu
(The Gwollu Water Board Chairman)

Appendix I: Household questionnaire

Introduction

I am currently conducting a study on water management in your community. The aim of the study is to understand the state of water supply in the community and how the water system is managed. I have chosen to come to (**community name)** because you have a small town water system. The results of this survey will be kept confidential. I need to take your background (including your name, section/house number household size, age, occupation) as part of the study to enable me cross check in case I need further information from your household. However, you are assured that your name will not appear anywhere on the main survey report. But if you wish that your name appears, then as and when necessary, I will do so.

Do you wish to proceed with the survey? 1. Yes 2. No (if no, STOP and ask for reasons)

Background of respondent

Name of respondent:……...
Status in the household: …….
Date of interview:……
Name of community……..House No./Section:……..

1. Sex of respondent:
   1) Male [ ] 2) Female [ ]

2. How old are you? 1). Less than 20years 2). 20-30 years 3). 31-40 years
   4). 41 – 50 years 5). More than 50 years.

3. What is your marital status?
   1) Married 2) Single 3) Divorced 4) Separated 5) Widowed

4. What is your religion?
   1) Christian 2) Islam 3) Traditional 4) Other (specify:……..)

5. How many people, including yourself, live in this household (Household size).....

6. What is the highest formal education you have attained/completed?
   1) No formal education
   2) Primary Education
   3) JSS/Middle School
   4) Vocational/Technical
   5) SSS/O'Level/A'Level
   6) Training College
   7) Tertiary (University, Polytechnic)

7. What is the main occupation/source of livelihood (economic activity) of the household?
   1) Farming
   2) Commerce
   3) Industrial activity
   4) Transport/vehicle operation
   5) Construction/manufacturing
   6) Public/civil service
   7) Others (specify……)

Water supply and access to water

8. What is your main source of water?
   1) Public stand-posts 2) Indoor tap (skip to 12)

9. What is the distance from the water source to your house?
   1) Less than 250m 2) 250m-500m 3) 500-750m 4) More than 750m

10. Currently, how long (in minutes) does it take to fetch water and return home?
    1) Less than 30min 2) 31-60min 3) 61-90min 4) More than 90min

11. If pay-as-you fetch, on average how much do you pay per day or per week? (Please ask for the highest and lowest amount ever paid)
Highest: ..... Lowest: ...../day
Highest: ..... Lowest: ...../week

Performance of vendors

12. How would rate the performance of the vendors in relation to their assigned roles (in terms of regularity at stand-posts, cleanliness of stand-post, etc.)?
1) Very Good 2) Good 3) Fair 4) Bad 5) Can't Tell

Please explain your answer……..……..

CBWM Rules

13. Do you know of any rules/regulation/bye-laws governing the management and use of water from the system? 1) Yes 2) No

14. If yes, what rules/bye-laws about the management and use of water (including public stand-post) do you know of (probe for explanations)? ……..

Billing/tariff

15. Do you understand the billing methods of your water?
1) Yes 2) No 3) Was taught but have forgotten
(Probe for the knowledge of respondent on the process of fixing tariffs/rates)

16. If monthly payment, on average how much do you pay? *(Please ask for the highest and lowest amount ever paid and probe for reasons behind the variation in bills)*
1) Highest: ..... Lowest: ...../month 2) No idea of the amount

17. Do you know how the money collected (water revenue) to run the water system is spent?
1. Yes 2) No
Remarks: ……..

18. What do you think about the current water rate?
1) High 2) Normal 3) Low

19. Please explain your answer ……

20. If too high, how are you adjusting/adapting to it as a household? ……

21. Does the mode of payment or the amount you pay limit the quantity of water used by the household?
1) Yes 2) No

Ownership and control

22. Who owns the water system? (Don't pre-empt but listen to first person/organisation the respondent mentions)
1) Community
2) WSMT
3) Traditional Authority (Chief and elders)
4) District Assembly
5) Region level actors (e.g CWSA)
6) NGOs (specify…….)
7) Religious body (specify…….)
8) Other (specify …….)
9) Don't know

23. How does the said person/organization own the water system? ……..

24. Who (person/organisation) is the most influential or has control over the water systems?

25. Please explain your answer……..

Water services and water loss

26. How is the current *(within the past one month)* water supply service? *(Please tick where applicable)*

Scale	Quality	Tick
Excellent	*Clear, no visible particles, tastless & no smell*	
Good	*Presence of one of the above elements*	
Poor	*Presence of all above elements*	

27. How is the current *(within the past one month)* water supply service? *(Please tick where applicable)*

Scale	Pressure	Tick
Excellent	*High pressure throughout*	
Good	*Intermittent pressure*	
Poor	*Low pressure at all times*	

28. How is the current *(within the past one month)* water supply service? *(Please tick where applicable)*

Scale	Reliability	Tick
Excellent	*Continuous supply for 24hr/week for a month*	
Good	*Intermittent supply but more than 4days/week*	
Poor	*Highly intermittent supply, less than 4days/week*	

29. Is there water loss in this community?
1) Yes 2) No 3) Don't Know

30. What are the MAIN possible obstacles in fighting water losses? ……..

31. If you use indoor tap, generally, do you have timely maintenance when your tap leaks?
1) Yes 2) No

32. Overall, what is your level of satisfaction with the water services in the community?
1) Very satisfied 2) Satisfied 3) Neutral 4) Dissatisfied 5) Very dissatisfied

Community participation and decision making on the water system

Please tell me whether you or someone in your household participated in following decision-making

No.	Before the project, did your household participate in:	1. Did not participate/give input 2. Participated or gave input 3. Don't remember
33	Deciding on or electing the WSMT?	1 [ ] 2 [ ] 3 [ ]
34	Contribution towards construction of the system; such as labour or cash contributions?	1 [ ] 2 [ ] 3 [ ]
35	Setting the tariff for water provided by the system?	1 [ ] 2 [ ] 3 [ ]

36. How well do you think the various sections of the community are represented in the management of the water system?
1) Highly representative 2) Somewhat representative 3) No representative

37. Within the last two months, was there any meeting between community members and the water management organisations in your community? 1) Yes 2) No 3) Do not remember.

38. In most instances, how does the community/WSMT make decisions about the management of the water system?
1) WSMT takes final decision and informs the community members
2) The community members and WSMT deliberate and take decision together
3) WSMT members hold a discussion, consult the community and decide together
4) WSMT takes decision with outsider agencies
5) Do not know how decisions are made

39. To the best of your knowledge, have community members ever protested against any decision of the WSMT about water management?
1) Yes, always 2) Yes, sometimes 3) I do not know 4) Never

Water users and WSMT engagement

40. Do you know how often the WSMT should hold meetings with the community members?
1) Yes 2) No

41. In your opinion, does the WSMT consult the community as often as it should?
1) Yes 2) No 3) Don't know

42. If no, should they consult more? 1)Yes 2) No 3) I am indifferent

43. Do you know what happens and what is discussed at WSMT or community meetings about the management of the system? 1) Yes, sometimes 2) Yes, most of the time 3) No

44. In general, do you trust the operations of the WSMT/Operation staff?
1) Yes, all of them 2) Yes, some of them 3) No.

45. Why do you trust or distrust them?.....

46. Overall, how satisfied are you with the management and activities of the WSMT?
1) Very satisfied 2) Satisfied 3) Indifferent 4) Dissatisfied 5) Very dissatisfied

Success and appropriateness of CBWM

47. How would you regard community management of water system in this community?
1) Successful 2) I do not know 3) Unsuccessful

48. Please explain……..

49. Is the concept of community-based management of the water system appropriate in this community?
1) Yes 2) No 3) I do not know

50. Please explain……

Appendix J: i-vii Checklists for focus group discussions and interviews

J i. Checklist for interviews with water and sanitation management teams and operating staff

Name of community: _____ Date:_____
District:_____ Time started:____
Number of men present: _____ Time ended:____
Number of women present: _____

Composition of management staff

A. WSMTs

1. What is the current composition of the WSMT? (Probe for details in terms of gender and positions assigned, the number of members during inauguration and the current position).

2. How was the WSMT set up? (That is, describe the approach used in getting the WDST member).

3. What is the term of office (duration) of the Team? (Probe for how many terms a member can serve as WSMT).

4. Have there ever been changes in the membership of the WSMT during their term of office? i) Yes ii) No

5. If there have been any changes in the membership or selection of Team members, what were the reasons for making these changes?

B. Operating staff and vendors

1. What is the current composition of the Operating Staff? (Probe for details in terms of gender and positions assigned).

2. How were the members recruited?

3. What was the mode of recruiting the water vendors (at the public stand-posts)?

Functions and control over water systems and other water sources

1. What are the functions of the WSMT, the operating staff and the vendors?

2. At the community level, what is the nature of interaction among these management bodies related? (Probe for the chain of control, information flow and collaboration among them).

3. Is the WSMT responsible for the management of all public water sources (boreholes, stand-posts, hand-dug wells) in the community?
4. 1). Yes 2). No 3). Some (Specify :……..)

5. If no, who is responsible for the other facilities?

Management staff-water user engagement
At this stage, I would like us to discuss the relationship of the management staff with the other community members in water management.

1. Do you hold meetings with the community members on issues relating to water management?
2. Yes ii) No

3. If, yes, how often do you hold these meetings? *(Find out the constitutional mandatory meetings in a year and how many were held within the last 12months).*

4. If meetings were held, what was the purpose of these meetings, what decisions were made at the meetings? *(Check minutes of meetings to find out what transpired at the meetings).*

5. In most instances, how does the management staff usually make decisions regarding the water systems?

6. How do you inform general community members about decisions that are taken about the management of the water system?

Rules governing water management
1. What are the rules/guidelines instituted for the water system management?

2. Who sets these rules?

3. How are these rules set?

Subscription to water services
1. What is the process involved in connecting water to households or for private purpose?

Technical considerations of the management staff
1. Does your community have a water management plan or strategy to guide the future direction of the water system? i) Yes ii) No iii) In the process of preparing one. *(Probe for details of any option selected)*

2. Generally, what are the strategic directions (plans) for the water systems (either documented or undocumented)?

Management staff and DWST relationship
1. What is the role of the DWST in your water management?

2. For the past one year how many times have they visited the WSMT? (Check the number of visits in relation to the expected number of visits. Ask for visitors' book to check).

3. What are the purposes of these visits? (Check recordings/minutes of these meetings if available)

4. Based on the discussion, in your opinion, do the DWST live up to expectations?

Attributes of the water systems
1. What is the capacity of the reservoir (HLT) of the water system?

2. How many mechanised boreholes are used to feed the HLT?

Water losses

3. How much of the water produced is lost in a year?

4. What are the main causes of water loss?

5. What are the possible obstacles in fighting water losses?

6. What preventive measures are in place to forestall future occurrence of water loss?

Water quality issues

7. How often do you carry out water quality test? *(Probe for who does it, at what interval and available quality test results).*

8. How often do you treat the water and what form of treatment is carried out?

9. What are the water quality complaints of customers?

Financial performance

10. Please explain how the water tariffs are set and reviewed in this community……

11. I would like to know how much it costs to run your water system vis-à-vis the amount revenue generated. Request financial records and check the financial statements/records of the WSMT and Probe for the categories of revenue sources and the components of expenditure. Discuss follow up issues based on the financial performance of the WSMT.

12. How often does the District Assembly audit the finances of the water systems? (check for audit reports)

Equity in water price and access

13. Equity between sectors/usage types: What conditions are attached to different sectoral usage of water (in terms of tariff structure, priority)?

14. Equity between social groups: There are some people who genuinely cannot afford the cost of water, what provisions are made for such people to access water?

Training and external support for WSMT

15. For the past two years, what training have you received as management staff? (Probe for nature of training, source of training and impact on water management).

J ii. Checklist for interviews with water vendors

Name of Community: _____ Date:_____
District:_____ Time started:____
Number of men present: _____
Number of women present: _____

1. How were you selected to be the attendant at the stand-posts? (let each vendor give his/her experience).

2. How long have you worked here as water vendor? (Ask for dates of those who were employed earlier and those who were employed later).

3. After the recruitment, were you trained on your job as vendors? (Probe for the areas that they were trained and who trained them).

4. If you were not trained, how are you able to operate the stand-posts?

5. Will you need training? If so, in which areas?

6. What rules/bye-laws exist in serving as a vendor? (Probe for categories of rules).

7. How much do you sell a basin of water at your stand-post? (Get specific vendor experience).

8. Have you made a complaint relating to the functioning of the public stand-posts within the past 3months? a. Yes b. No (get individuals' experience)

9. If yes, what was the nature of the complaint?

10. What was the result/outcome of the complaint?

11. Do you have meetings with the WSMT/Operating staff on the management of the water?

12. Do you hold meetings as vendors to take certain decisions?

J iii. Checklist for focus group discussion at regional level

1. Identification: Who are the actors at the various levels, and what are their specific responsibilities in water management?

2. Intra-level Interaction: How are the various actors Actors/stakeholders relating in their functions?

3. What are the rules that regulate the interaction at the community level?

4. Inter-level Interaction: What is the nature of interaction between the district and regional level actors on the one hand and the community level actors on the other?

5. What are the rules that regulate the inter-level interactions?

6. Can two people (participants) lead the rest of the participants in sketching the arrangement all the actors identified above?

7. From the above discussion, what is the nature of ownership of the water systems?

8. What are the key drivers/factors that affect the management of the STWS at the various levels? Probe for the underlying causes, and how management is adapting to them.

9. What is your view on involving the private sector in the management of the small town water systems in your area? (Let each community explain its view and then seek the views of DWST/CWSA/RCC).

J iv. Checklist for interviews with national and regional CWSA

1. What is the core function of the CWSA in terms of water provision and management?

2. What is the current state of the 5 or 2.5% community contribution towards capital cost of the water projects?

3. What is the nature of ownership of the water systems?

4. What is the basis for the change from Water and Sanitation Development Board to Water and Sanitation Management Teams?

5. What guidelines exist for tariff setting in small towns? (Probe for current ceiling/range for tariffs in small towns, if any).

6. Under what conditions do we involve Private sector in the management of the STWSs?

7. What are the major challenges with water provision and management, especially in small towns?

8. What is your view on the ability of CBWM to operate without 'external support', based on your working relation with the small town water systems?

J v. Checklist for focus group discussion with DWSTs

1. What is the current composition/membership of DWST?

2. What is the nature of obligations (bidirectional obligation) between the DWST and the WSMT? That is, what is expected from the DWST and then the WSMT at the community level?

3. Specifically, how often does the DWST meet with the WSMT/operation staff in a year? Probe for plan visits and ad hoc visits by the DWST.

4. How does the DWST finance its activities, especially monitoring functions of existing water systems?

5. How often do you audit the finances of the WSMT? Under what conditions do you conduct auditing of the WSMT finances? Ask for details of the reports.

6. How are tariffs set in small towns; and what is the role of the DWST in the process?

7. Which actors do you relate with in the management of small town water systems?

8. How were the WSMT constitutions and bye-laws prepared and adopted by the various WSMTs?

9. What are the key challenges in water system management? (Probe for challenges at the district level and the community level).

J vi. Check list for interviews with key informants at the community level

1. Get an overview of the provision of the water system in the community. Probe for community cooperation or otherwise during the process.

2. What is the process of getting the management bodies (WSMT members, vendors and operating staff)?

3. Probe for details of their functioning, how they represent the various sections in decision making.

4. What is your view on the general functioning of the water systems? (Probe for availability of water services and issues of private connection).

5. What is the nature of user-WSMT engagement in this community?

6. What are the key challenges of water management in this community? (Probe for issues on water loss, financial management, tensions within community and among management staff, issues of corruption).

7. What is the way forward for this?

J vii. Checklist for observations in the communities/transect walk

1. Observe the stand-posts in the communities and the check surroundings of the stand-post and cleanliness of the pad.

2. With the guide of an operating staff, walk around the distribution and transmission lines to observe the presence of exposed pipes and leakages.