

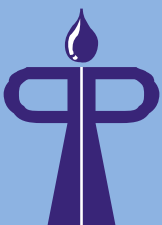
# Working Document

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## Management models in urban and small town water sector in Ghana

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Tripartite Partnership (TPP) Project

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## TABLE OF CONTENT

TABLE OF CONTENT .....	i
LIST OF FIGURES .....	ii
LIST OF TABLES .....	ii
LIST OF ABBREVIATIONS.....	i
1.0 INTRODUCTION AND BACKGROUND .....	1
1.1 Methodology Used .....	1
1.2 Limitation and Challenges .....	2
2.0 OVERVIEW OF THE GHANA WATER SECTOR .....	3
2.1 Sector Reforms .....	3
2.2 Overlap of the Small Towns and Urban Water sub-sectors .....	4
3.0 Urban water management models.....	6
3.1 Urban water management.....	6
3.2 Management Models for water supply within urban and peri-urban areas.....	8
3.2.1 Self supply .....	9
3.2.2 Urban Water Boards / Water User Groups .....	9
3.2.3 Utility-Community-Private Partnerships .....	10
3.2.4 Small scale private producers .....	13
4.0 Small town water management models .....	16
4.1 Community ownership and management in small towns.....	17
4.1.1 Community Ownership and Management with WSBD.....	19
4.1.2 Community Ownership and Management with WSDB and Private Operator .....	20
5.0 Conclusion .....	22
ANNEXES.....	23

## LIST OF FIGURES

Figure 1: Utility management model .....	6
Figure 2: Map showing GWCL/AVRL Systems and Service Areas .....	7
Figure 3: "Self-supplier" and her hand dug well in peri-urban Kumasi .....	9
Figure 4: urban Water Board management model .....	9
Figure 5: utility-community-private sector management model .....	10
Figure 6: Map Showing Proportion of Water Use among Customers .....	12
Figure 7: small scale private producer management model.....	13
Figure 8: Left: Young boy fetching water from a neighbour in peri-urban Kumasi. Right: Young girl fetching water from a neighbour's spring in peri-urban Kumasi. ..	14
Figure 9: Water Health Centre (photo: Water Health Ghana) .....	14
Figure 10: Examples of water management models in peri-urban areas in the Greater acra region.....	15
Figure 11: Small town management models for towns with a population smaller than 50,000.....	16
Figure 12: Map showing Project Donors in the Small Towns Water Sector.....	18
Figure 13: DA-WSDb partnership management model.....	19
Figure 14: Bulk supply management model .....	20
Figure 15: public-private partnership management model .....	21

## LIST OF TABLES

Table 1: Criteria for Estimating Water Demand.....	17
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## **LIST OF ABBREVIATIONS**

AVRL	-	Aqua Vitens Rand Limited
COM	-	Community Ownership and Management
CWSA	-	Community Water and Sanitation Agency
CWSD	-	Community Water and Sanitation Division
DA	-	District Assembly
M/DWST	-	Municipal or District Water and Sanitation Team
EHA	-	Environmental Health Assistant
GWCL	-	Ghana Water Company Limited
GWSC	-	Ghana Water and Sewerage Corporation
NCWSP	-	National Community Water and Sanitation Programme
NGO	-	Non-Governmental Organisation
NWP	-	Netherland Water Partnership
O&M	-	Operation and Maintenance
OM	-	Optimisation Model
PURC	-	Public Utilities Regulatory Commission
TPP	-	Tri-Partite Partnership
WASH	-	Water, Sanitation and Hygiene
WSDB	-	Water and Sanitation Development Board



## **1. INTRODUCTION AND BACKGROUND**

This mapping study has been carried out under the Tripartite Partnership (TPP) Project. The TPP Project culminated from an inception study in Ghana that involved Ghanaian partners and the NGO caucus of the Netherlands Water Partnership (NWP). The initiative sought to determine the feasibility of multi-stakeholder partnership - involving public and private sector, NGOs and the Community – for sustainable management and delivery of water supply services to the urban poor in Ghana. Analysis of the existing situation showed the capacity gap of dealing with services delivery to the urban poor. The project has been designed to respond to currently precarious situation with water, sanitation and hygiene (WASH) delivery in small towns and peri-urban areas and the core issue of lack of capacity for dealing with the challenges of pro-poor urban water and sanitation services. The TPP Project seeks to develop Effective Innovative Management Options for the delivery of water supply and sanitation services to the urban poor in Ghana.

The overall objectives of the TPP project are three-folds:

- Identify a range of innovative management models for providing water services to the urban poor
- Test innovative models through selected demonstration projects
- Utilize the learning outcomes of the project to support the creation of the enabling environment (policy, regulation, legislative frameworks) for these models to be scaled up.

The TPP Project, as part of the initial activities, and in fulfilment of its objectives, undertook three quick studies:

- An analysis of the institutional framework related to the delivery of water and sanitation services in small towns and urban areas in Ghana
- Mapping of existing management models for delivery of water and sanitation services in small towns and urban areas in Ghana
- An overview of global experiences for water delivery in the urban and small towns' context.

This report presents the findings from the mapping of existing innovative management approaches for water supply in the urban and small town contexts in Ghana. The exercise sought to identify existing management models for addressing water service needs, with a view to identifying innovations and promising approaches for further research.

### ***1.1 Methodology Used***

For the study, secondary data was collected, compiled and analysed. Due to time constraints, resources requirement and the level of detail required at this stage of the

assignment, data was collected mainly at national level and at regional level. Data collection was guided by a checklist. In addition, sector documents relevant to the study were reviewed. For the purpose of the study, systems that serve population of 2000 (census year 2000) were captured. The year 2000 was used as reference point for the purpose of reliable and consistent population data from the national census figures in 2000.

The first step of data gathering was at the national level. Data were collected from the head quarters of the various state agencies including AVRL/GWCL, CWSA, PURC and the MWRWH. Here, data collection from databases as well as interviews with key staff was conducted.

Field data gathering from all the 10 regions was also conducted. All the regional offices of both AVRL/GWCL and CWSA were visited. The objective was to collect more regional specific data to supplement the information gathered at the national level.

### ***1.2 Limitation and Challenges***

Two major challenges were faced during the study with respect to access to data.

- Coincidence of data collection activities with other Sector programmes which led to delayed access to key respondents.
- Adequacy of information the regional level. CWSA is in the process of organising its database. At the moment there is limited secondary information available at the regional and national levels. Therefore, some issues on the checklist could not be responded to because they required data gathering at the district or sub-district levels (visiting the specific systems).

## **2. OVERVIEW OF THE GHANA WATER SECTOR**

This chapter gives an overview of the main sector reforms that have taken place in the Ghana water, sanitation and hygiene (WASH) sector in the past decades. It presents the two main sub-sectors which have emerged from these sector reforms and how these sub-sectors overlap.

### ***2.1 Sector Reforms***

The Ghana Water Sector has gone through a series of reforms to reach its present status. From 1965 to 1998, Ghana Water and Sewerage Corporation (GWSC) was the institution that was responsible for the provision of improved water, as well as sanitation services, for the country's population. With a low delivery capacity, all efforts were focused on the urban areas, which meant that, generally, most of the poor people (mostly in rural and small towns) were not being served. While in early 1990s the water supply coverage for the urban area was 60%, the small town and rural coverage figure stood at 28%. This led to the creation of a department within the Corporation to be solely in charge of the provision of improved water and sanitation to the small towns and rural population. Some progress was made with the implementation of facilities, but this was not sustainable due to non-payment of tariffs and poor maintenance culture. The situation called for the development of the National Rural Water and Sanitation Sector Strategy, which led to the launch of the National Community Water and Sanitation Programme (NCWSP) in 1994. A unit, Community Water and Sanitation Division (CWSD) which was semi-autonomous, was created within GWSC to manage the delivery of water and sanitation services in rural areas and small towns.

In 1998, by an act of parliament (Act 564), the division was transformed into an agency (Community Water and Sanitation Agency – CWSA) to facilitate the delivery of potable drinking water and related sanitation services to small towns and rural communities. Water systems provided under community water arrangement, were to be owned by the district assemblies. The agency has been operating since then as an autonomous body which focuses on small towns and rural water service delivery, whilst the GWSC was transformed into a limited liability company, Ghana Water Company Limited (GWCL), with a focus on providing potable water for the population in the urban sector. GWCL was to concentrate on the provision of safe water to large urban towns and therefore, transferred the responsibility of about 120 small town systems to the district assemblies. Most of these systems, according to the CWSA, were less viable but relatively large. Some of these systems have since the handing over undergone rehabilitation under the CWSA. With the sector reforms of 1998, provision of improved sanitation services became the responsibility of local government.



In Ghana, sanitation facilities and services are therefore implemented by the Metropolitan, Municipal and District Assemblies (MMDAs) through the M/DWST (with respect to water related sanitation issues implemented by the CWSA) and the Environmental Health Department. The assemblies are supervised by the Ministry of Local Government, while the regulatory responsibility lies with the Environmental Protection Agency (EPA).

## ***2.2 Overlap of the Small Towns and Urban Water sub-sectors***

Since the sector reforms in 1998, the water sector in Ghana has been divided into 2 subsectors: the urban water sector, under GWCL, and the rural and small town's water sector, under CWSA. However, different definitions on what constitutes urban communities and small towns are in use in Ghana. The Ghana Statistical Service defines urban communities as those with populations above 5,000, which implies that communities smaller than 5,000 inhabitants are considered rural.

According to the CWSA Small Town Sector Policy 2004, a small town is a community with population of 2,000 to 50,000. This implies that urban water will constitute areas with populations above 50,000. As GWCL is responsible for water supply in the urban areas, its mandate basically is to provide these services in towns bigger than 50,000 inhabitants, while towns under 50,000 inhabitants fall under the mandate of CWSA.

However, the National Water Policy (NWP) defines small towns as “*a community that is not rural but is a small urban community, with population between 2,000 to 30,000 that has been mandated by the relevant authority (ies) to manage its own water and sanitation systems*”. According to this definition, it is within GWCL's mandate to manage water supply for communities smaller than 30,000 people, if so decided by the local authorities.

The map below displays urban areas and small towns in Ghana, both under GWCL as well as under CWSA. It shows that some towns, especially the ones with a population between 15,000 and 30,000, can either fall under GWCL, or under CWSA, regardless of the population size. Chapter 3 will give an overview of urban water management models, describing both the utility model, as well as models for supplying water to (peri) urban areas not served by the utility. This will be followed by a description of small town management models in chapter 4.

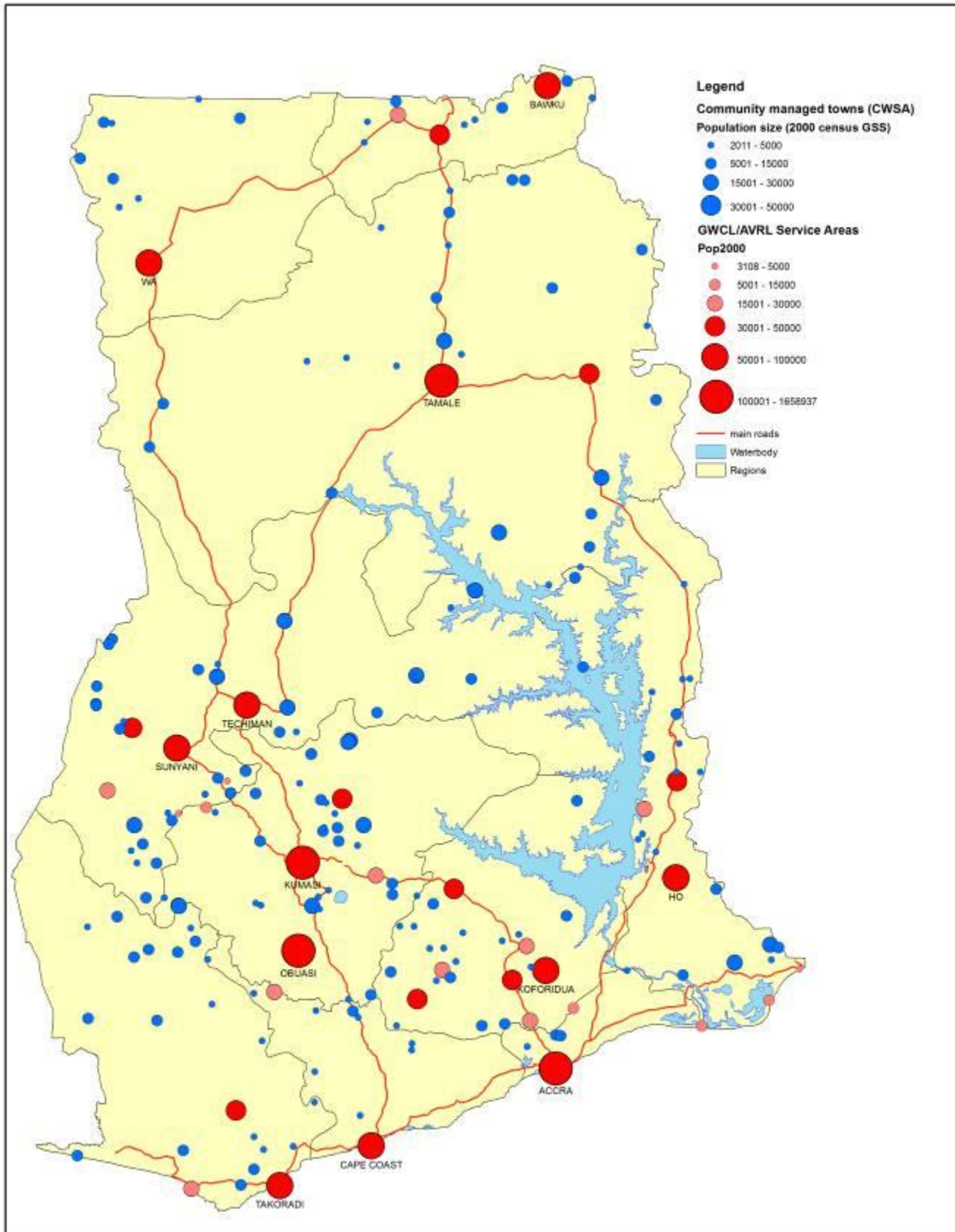


Figure 1-1: Small towns and urban areas in Ghana

## Urban water management models

This section describes management models in urban and peri-urban areas in Ghana. The first part of the chapter focuses on the main management model for urban areas: the utility management models. However, in urban and peri-urban areas not covered by the utility, alternative management models can be found, which are discussed in the second part of this chapter.

### 2.3 Urban water management

Ghana's urban water is managed as the public utility by a public utility company, GWCL (formerly GWSC). Until the introduction of a 5-year Management Contract in 2006, between the GWCL (on behalf of the Government of Ghana) and AVRL (Aqua Vitens Rand Ltd, a not-for-profit international company to act as operator for and behalf of GWCL), GWCL was the holder of urban water systems, as well as in charge of the production and distribution of water for domestic, public and industrial and commercial purposes within the urban sector. Under the Management Contract which started in 2006, AVRL is responsible for operation of the systems while GWCL remains the asset holder.

The utility is regulated by the Public Utility Regulatory Commission (PURC), which regulates both the urban water supply utility, as well as the electricity company.

The figure below gives a graphic representation of the roles and responsibilities under this model.



Figure -147848415-2: Utility management model

AVRL has a central headquarters in Accra, in addition to regional offices and district offices. The AVRL regions coincide with the national administrative regions, except in the case of Greater Accra Region which has been divided into three different AVRL regions. However, the AVRL districts do not follow the national district boundaries.

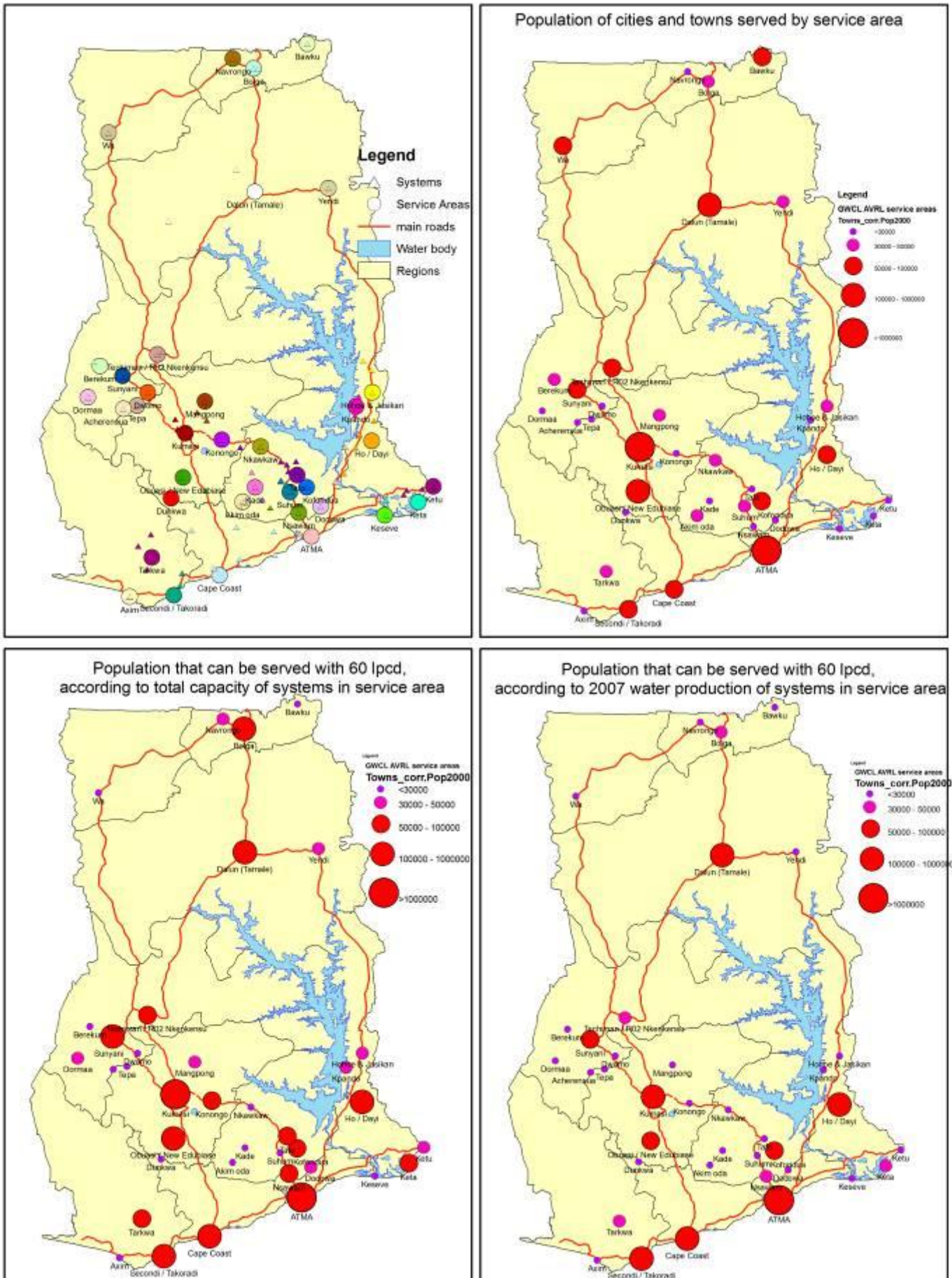


Figure -147848415-3: Map showing GWCL/AVRL Systems and Service Areas

In urban areas, water services are delivered to domestic consumers through household connections, private stand pipes, and tanker services. Most poor people do not get direct access to services but rather depend on secondary and tertiary suppliers for their water supply needs. This leaves the poor with high cost of the service, inadequate supply and poor quality of water. In the urban water sub-sector, according to a paper done under the SWITCH project, “per capita domestic water consumption is said to vary between 60 and 120 litres per capita per day (in the well served areas only) and 25 to 60 litres per capita per day when poor households buy water from vendors.” ([http://www.switchurbanwater.eu/outputs/pdfs/CACC\\_PAP\\_Planning\\_urban\\_water\\_Ghana.pdf](http://www.switchurbanwater.eu/outputs/pdfs/CACC_PAP_Planning_urban_water_Ghana.pdf))

In total, 90 systems are operated by AVRL / GWCL. These systems provide water to a total of 37 service areas. Each service area is served by one or more systems that supply water to the population within the service area, as shown in the map below. In only 16 of the 37 service areas, the total capacity of the system(s) has the potential to serve 50,000 people or more 60 lpcd<sup>1</sup>, while the total amount of water produced in 2007 was sufficient to serve 50,000 people or more 60 lpcd<sup>1</sup> in only 9 of the 37 service areas, as illustrated in the maps below. The installed capacity of the ten biggest supply areas constitutes about 90% of the total capacity of the 37 supply areas as shown in the Annex 1 below.

The utility is working towards charging economic tariffs for services but this has not been easy because the utility has not been able to provide services in terms of quantity and quality that are commensurate with full cost recovery. In the urban water subsector, water tariffs are proposed by the utility for approval by the PURC. Current charges for domestic consumers are USD 0.57 (GH¢ 0.66) per 1000 litres for a monthly consumption of 20,000 litres and below, and for any consumption above 20,000 litres tariff is USD 0.79 (GH¢ 0.91) per 1,000 litres. Bills are sent to customers by the utility monthly for payment.

#### ***2.4 Management Models for water supply within urban and peri-urban areas***

Besides the traditional utility management model, which is applied to supply water to people in urban areas and small towns, different management models occur, especially in the peri-urban areas and sectors of small towns which are not covered by the utility. These include:

- Self supply
- Water Boards
- Water vendors:
  - Utility – community – private partnership

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<sup>1</sup> Assuming physical losses of 10% and commercial and industrial water use of 15%

- Small scale private producers (individuals or organisations)

#### 2.4.1 Self supply

In case of self supply, ownership, management and operation is fully in hands of the individual water user. This option is a growing phenomenon in the peri-urban and small town rich and medium class areas. However, not much evidence-based information exists on this at the moment.



Figure -147848415-4: "Self-supplier" and her hand dug well in peri-urban Kumasi

#### 2.4.2 Urban Water Boards / Water User Groups

AVRL has implemented a project in a section of Teshie, under which a Water Management Board has been established to oversee tanker supplies to various selling points.

PURC, in collaboration with GWCL/AVRL, WaterAid Ghana and Partners is planning to pilot supply and payment options to low income water-deprived communities, using a community management model. Under this initiative, Water Management Board or Water User Groups will be put in place in the beneficiary communities. These will work in consultation with the communities to secure appropriate locations for the installation of water tanks and to contract vendors to operate these water selling points. The beneficiary communities include South Teshie, Glefe-Agege and Nima.

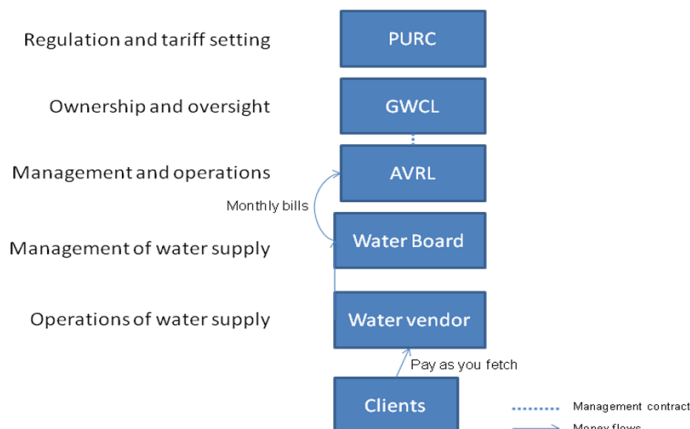


Figure -147848415-5: urban Water Board management model

### 2.4.3 Utility-Community-Private Partnerships

Under this model, the ownership, management and operation of the water supply is in the hands of the utility. The ownership, management and operation of the water distribution however, is in the hands of a private person.

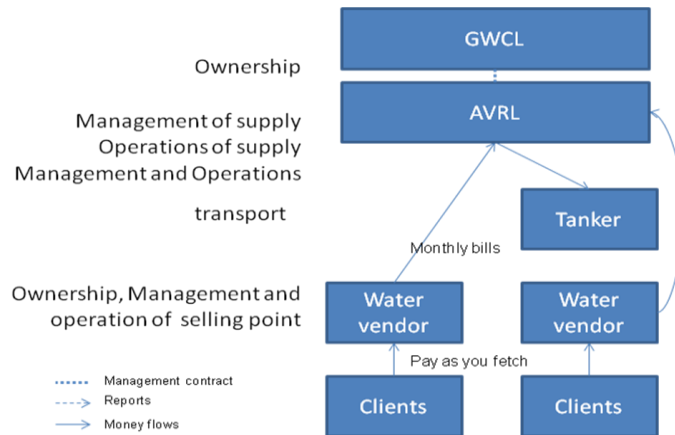


Figure -147848415-6: utility-community-private sector management model

#### *Variants of utility-community-private partnerships*

There are quite a number of examples of this model, most of which can be found in peri-urban areas.

**Private standpipes** are provided for a cluster of houses usually in poor neighbourhoods where the distribution mains are available but where either because of the nature of the development patterns of the areas or because of lack of capacity on the part of consumers to extend connections to their homes, there is the difficulty in connecting water to individual homes. A vendor (private person), manages the standpipe and earns profit from selling the water. The vendors pay monthly bills to the utility. The figure below gives an indication of standpipe water use in the different GWCL-AVRL service areas, in relation to other water use. There are also instances where individuals without community facilitation, enter into arrangement with the utility and operate standpipes.

**Water kiosks** are stimulated in some cases under the public standpipe model. To ensure that the vendor is dedicated and always available during the day time at the pipe site, to ensure at least 12 hours supplies to consumers, a kiosk with an initial capital is provided by the utility to the vendor to start the operations of a shop at the standpipe site. This way the vendor will not only always be at the site, but will augment his income from the sale of the water by the profit from operating the shop. The initiative is in a pilot process in Bolgatanga. It will provide an interesting case for further study in the near future.

**Holding tanks** are another example of facilities from which water from the utility is sold to clients. Holding tanks have been implemented as an initiative by the utility in Wa, the Upper West Regional Capital, to provide water to areas distant from the distribution lines. Under this initiative, consultations were held with residents and opinion leaders and an appropriate location was identified for the construction of a tank. AVRIL water tankers regularly supply water to the tank for redistribution to consumers. The role played by the community under this arrangement includes the identification of the site for the erection of the tank and the selection of a vendor to sell the water and manage the tanks. The same level of tariff is paid compared to household connections even though consumers have to walk distances in order to enjoy the service. Some level of tariff differentiation in favour of the consumers of holding tanks would compensate for the distance and time, and quality of water.





to be an interim measure for about 6 months, however, due to continuous demand for the services, the project has continued over one year.

An example of **NGO initiated utility-community-private partnership** can be found in Accra in the Zabon Zongo area (a poor area of Accra with migrants mainly from northern Ghana), under the West Africa Cities Project 1 & 2. Under this project WaterAid through its partner organisation on behalf of UN Habitat for Humanity, is working with communities and AVRIL to ensure that access to water and sanitation facilities is improved in poor communities in the city of Accra. The model has three main areas of intervention: water governance, water supply and sanitation. The project intends to demonstrate innovative and tested technologies where beneficiary communities play key roles in the water and sanitation sector, to document experiences for scaling up and replication in other cities. A similar initiative can be found in Old Ningo in the Dangme West District, located about 25 Kilometres from Tema where WaterAid Ghana, through its partner organisation Pronet Accra, with funding from the French Embassy is working with communities and GWCL/AVRL to improve water supply and sanitation in the peri urban community. The project was started in 2003 and has to involve all stakeholders in a participatory way to achieve a sense of ownership and sustainability. The project assistance included provision of high capacity storage tanks to the community which were located at vantage points and connected to Ghana Water Company main pipes and the tanks are manned by vendors.

#### 2.4.4 *Small scale private producers*

In case of small scale private producers, an individual, organization or a company owns, manages and operates the water supply from source to distribution point. Examples of this kind of model include individuals with a private hand dug well, borehole, spring etc, selling water to neighbors.

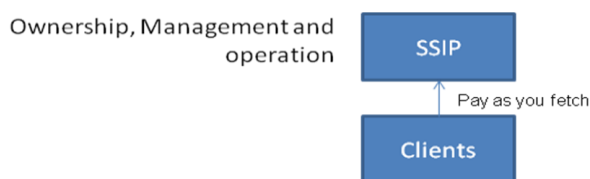


Figure -147848415-8: small scale private producer management model

An example of an organization as small scale private provider is WaterHealth International, which manages a six Water Health Centres in Ghana (5 in Ga West District in Greater Accra Region and 1 in South Dayi in Volta Region. See figure 10). WHCs are decentralized micro utilities that purify and disinfect water for household needs. WaterHealth International, a health-centered US based company with the primary purpose of developing and marketing proprietary, decentralized water

purification systems and services, assumes responsibility for the long term management and maintenance of the facilities. The Company also manages the collection and accounting for the user fees, and undertakes payments to service providers. The company trains local residents for much of the routine operation and care of the WaterHealth Centre as well as the delivery of water to users who are not near the WHC. Under the WaterHealth International model, ownership is to be with the community rather than with the company.



Figure -147848415-9: Left: Young boy fetching water from a neighbour in peri-urban Kumasi. Right: Young girl fetching water from a neighbour's spring in peri-urban Kumasi.



Figure -147848415-10: Water Health Centre (photo: Water Health Ghana)

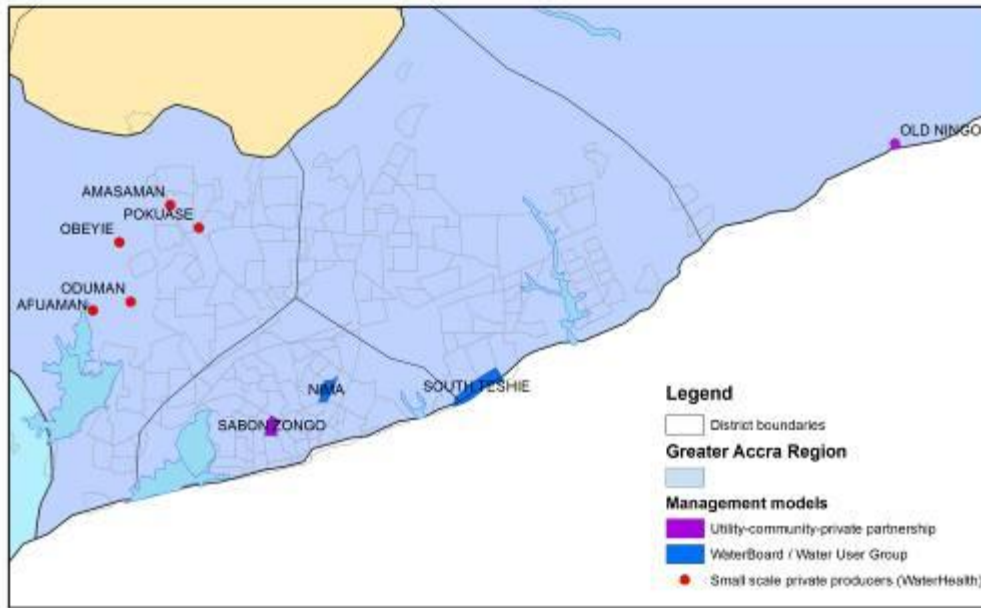


Figure -147848415-11: Examples of water management models in peri-urban areas in the Greater accra region

### 3. SMALL TOWN WATER MANAGEMENT MODELS

Three main management models are observable within the CWSA small towns' water sector in Ghana. These are:

- Utility management
- Community Ownership and Management with WSDBs
- Community Ownership and Management with WSDB and private operator.

Since the utility management model has been described extensively in chapter 2, this section will concentrate on the two variations of the community Ownership and Management models.

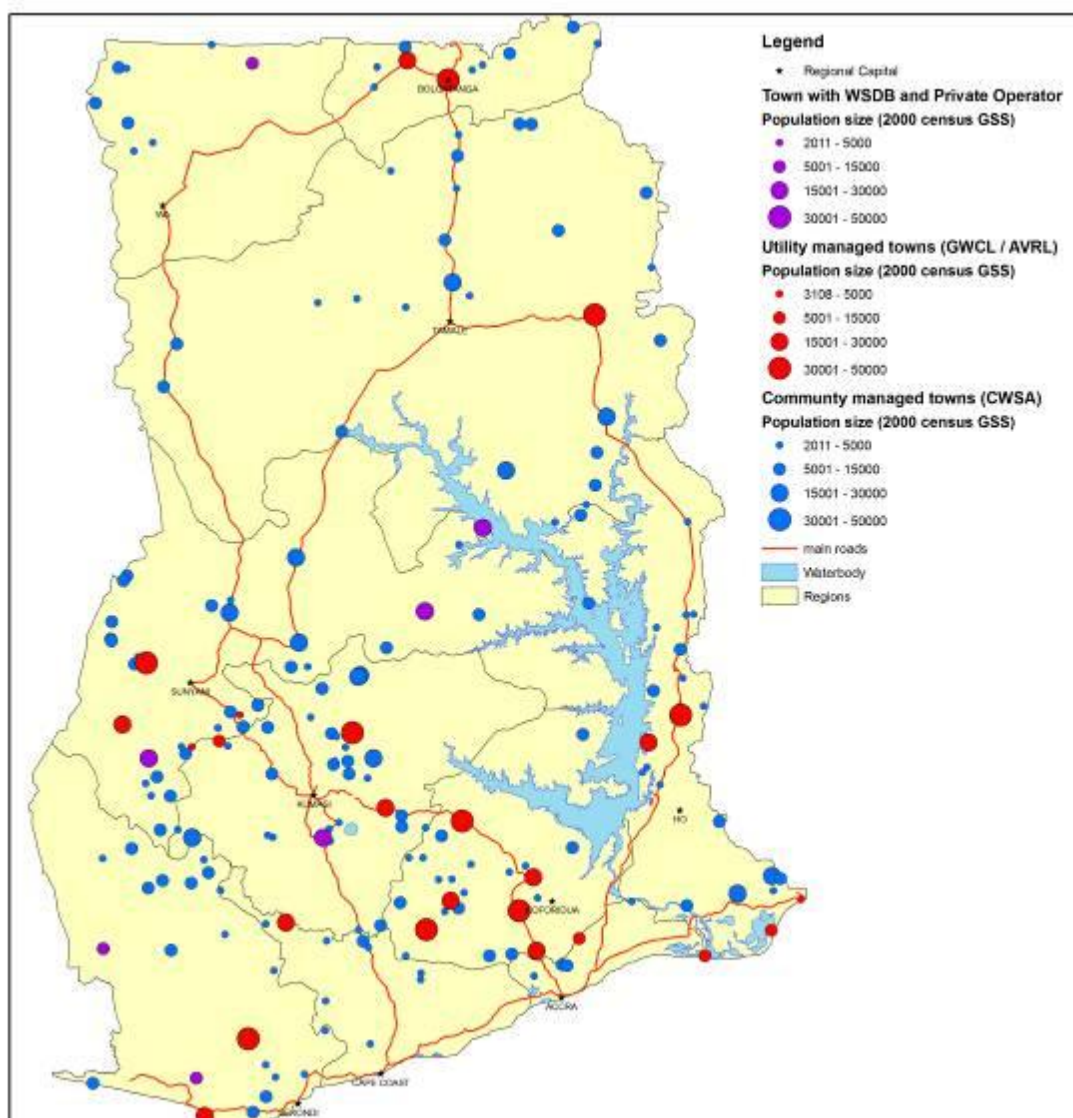


Figure 3-1: Small town management models for towns with a population smaller than 50,000

### 3.1 Community ownership and management in small towns

In small towns under the CWSA, the agency plays a facilitative role. The CWSA has a Head Quarters and Regional offices link with the respective districts through the District Water and Sanitation Team (DWST). All the DAs have DWST (District Water and Sanitation Teams) in charge of water supply and sanitation delivery to communities in the districts. The DWST is a three-member team seconded from District Environmental Health, Community Development and District Works Departments to provide technical support to the district in the planning and delivery of water and sanitation services in the districts. It has the District Planning Officer as the schedule officer.

The Municipal and District Assemblies are in charge of the implementation, operation and maintenance of the water facilities and service delivery. The districts are the owners of the systems. However, the day to day operation and maintenance are in the hands of Water and Sanitation Development Boards (WSDBs) which are set-up and trained for each system. The WSDBs can contract the operation and maintenance to a private operator or employ technical persons who work directly under them.

In small towns, standpipes and household connections are the common water services provided. The small town water systems are aimed at meeting the basic water needs of the population that they serve. Per capita water demand per day is estimated to be 20 litres for people with access to standpipes and 60 litres for people with access to household connections. The share of population having access to standpipes and house connections is determined based on socio economic and willingness to pay studies, and in accordance with the following:

Table 1: Criteria for Estimating Water Demand

<b>Category</b>	<b>Category I</b>	<b>Category II</b>	<b>Category III</b>	<b>Category IV</b>
<b>Population</b>	2,000 – 5,000	5,001 – 15,000	15,001 – 30,000	30,001 – 50,000
<b>% Standpipes</b>	80 – 90	75 – 85	70 – 80	60 – 75
<b>% Household Connections</b>	10 – 20	15 – 25	20 – 30	25 – 40

*Source: Small Towns Sector Policy (Design Guidelines), May 2004*

Small towns mostly experience minimal levels of small scale industrial and commercial activities with averagely high demand for water. The industrial and commercial demand is estimated to be 10 - 20 % of the domestic demand. In the design of small town systems, physical losses of 8-10% are taken into account. Losses of 10 - 15% are to be applied where existing pipelines are to be rehabilitated.

To benefit from a facility also implies that the community should be able to afford some cost, and to make a choice one must be willing to meet the cost associated with that choice. Though the communities pay just 2.5% of the capital cost of providing the facilities, the socio-economic status of most people living in rural areas, attests that this is quite high for many communities. The idea behind the 2.5% capital contribution is that, although it is insignificant to the cost of providing the facilities, it indicates that the community members accept the facility as their own. Likewise, if the community chooses a facility that costs a lot, it implies the community is ready to pay a high amount as their 2.5% contribution and must be prepared to fully meet the comparatively high costs associated with the operation and maintenance of such facilities.

The government of Ghana funds its water sector (capital investment) heavily from loans and grants attracted from foreign donors. In small towns water subsector, the donor involvement is very visible and stronger than in the urban water subsector. In the small town water subsector, major donors have specific regions or areas that they operate and play direct role in facilitating the delivery of the service through strong collaboration with the CWSA. This is illustrated in figure 12, showing which donor has been involved in the construction or rehabilitation of the small towns under CWSA.

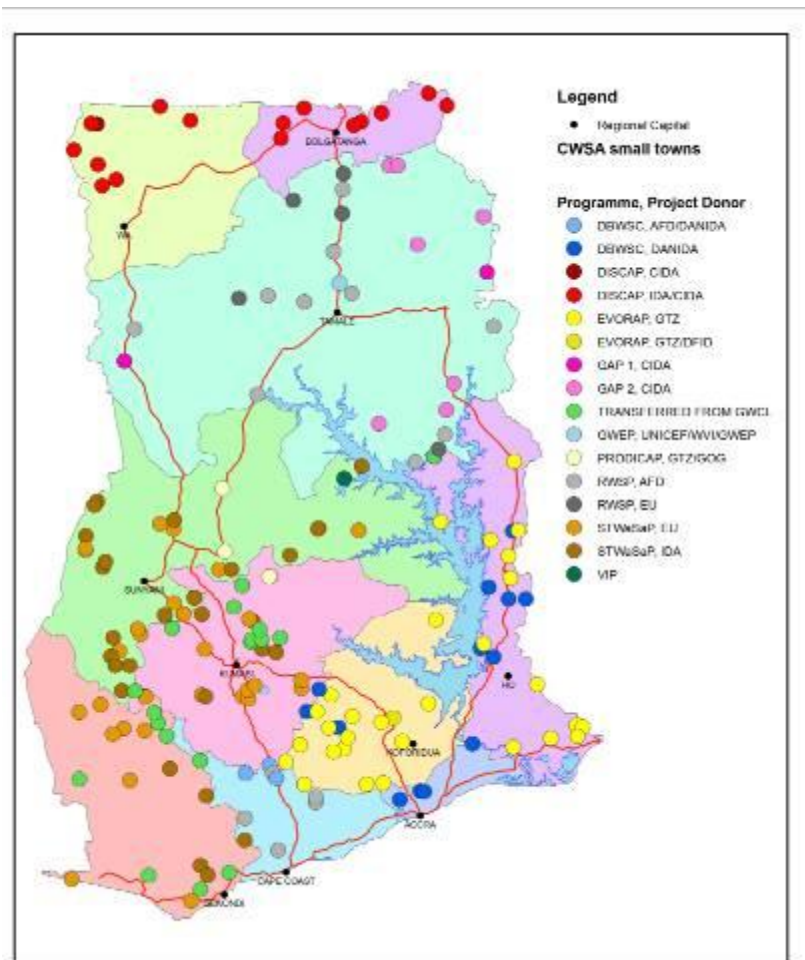


Figure 3-2: Map showing Project Donors in the Small Towns Water Sector

The responsibility of tariff setting is decentralised to the district level where the water boards or the operator proposes for the approval by the district assembly. In the urban water however, tariffs are set centrally and applied throughout the country. Tariffs are district based and range between slightly less than USD 0.56 (GH¢ 0.65) and slightly less than USD 1.67 (GH¢ 1.93) per metre cube of water.

### 3.1.1 *Community Ownership and Management with WSBD*

Under this model, the Municipal or District Assemblies are the legal owners of the facilities. The MDAs approve decisions of the WSDB, including tariff reviews, the WSDBs have the corporate responsibility and oversee the operation and maintenance. The WSDB engages/employs professionals (service operators) to undertake the operations and maintenance responsibilities. The DA is the regulator of the operations of the water supply services. This is the most prevalent management option for most small towns in Ghana under CWSA, as can be seen in the figure below.

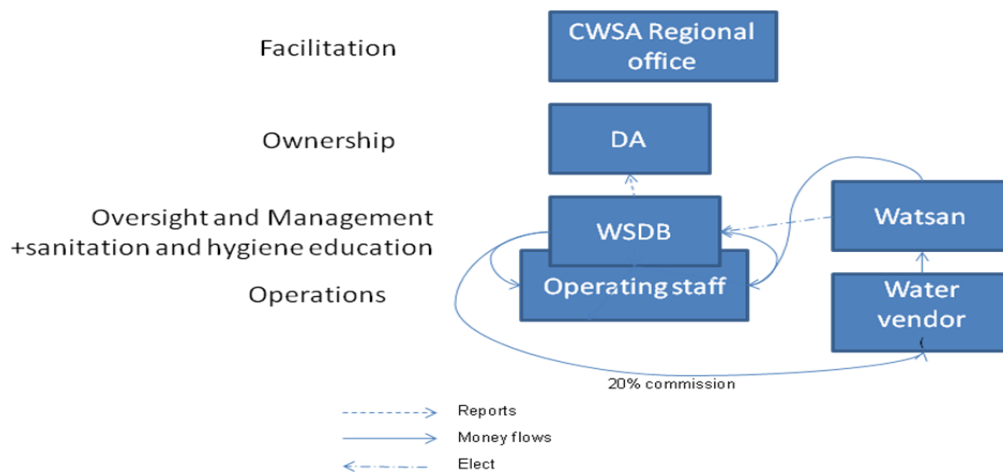


Figure 3-3: DA-WSDB partnership management model

### *Variants of the community management with WSDB model*

Owing to operational difficulties associated with this model due to weak capacity of the water boards, some interventions have taken place within this model to augment the capacity of the WSDB to perform their task. These include DISCAP and EVORAP (see figure 12).

Another variant on this model is the **DA-WSDB-WATSAN partnership** in which the distribution of water is further decentralized to beneficiary communities (WATSANS) through bulk supply. The WSDB supplies bulk water to sub-communities (electoral zones and/or rural communities along the pipeline) organised as Watsan Committees (WATSANS). The volume measurements are done using bulk meters. The various Watsan Committees engage Service Professionals (Service Operators) to undertake the operations and maintenance responsibilities and maintain the administrative and



oversight management responsibility of the water system in the sub-communities. This model is popular in the Northern Region among the EU and AFD water systems and is mostly found in systems that serve more than one community (see figure 12).

The last variant that will be presented here is the **Utility-Community Bulk Supply Partnership**. This model consists of GWCL/AVRL signing an agreement with DA/WSDB to supply bulk treated water (supply is metered). WSDB is then responsible for only the management of the water system i.e. the distribution, tariff setting and revenue collection in the community in which it serves. WSDB hires professionals to undertake the operations and maintenance responsibilities and maintains the administrative management of the water system. This model is practised in Savelugu in the Northern Region of Ghana where through the initiative of Unicef and Guinea worm eradication programme, GWCL/AVRL supply water to the Savelugu WSDB in bulk. This model can also be found in some smaller communities of Volta Region and is currently being tested by AVRL in the areas around Cape Coast in Central Region

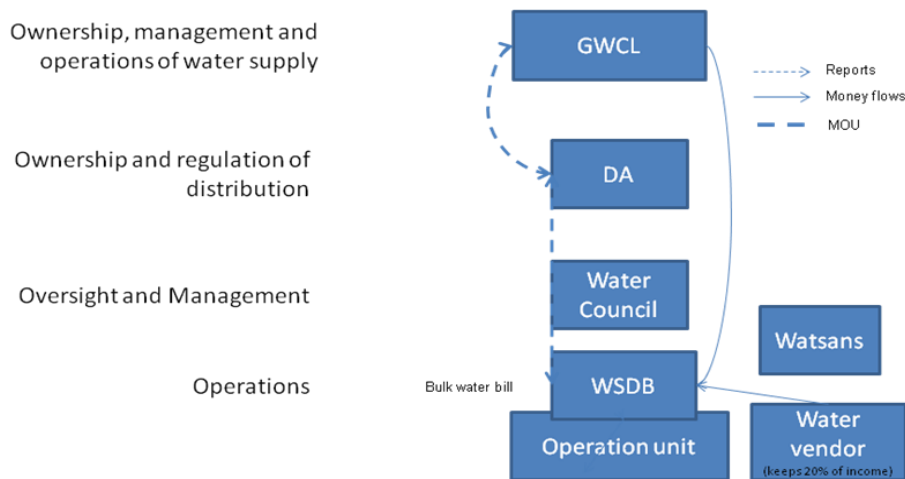


Figure 3-4: Bulk supply management model

### 3.1.2 Community Ownership and Management with WSDB and Private Operator

Under this model, the water system is legally owned by the district assembly which approves major decisions including tariff reviews. The WSDB enters into operation and maintenance contract with a private operator for a period of time, while the WSDB maintains the oversight responsibility.

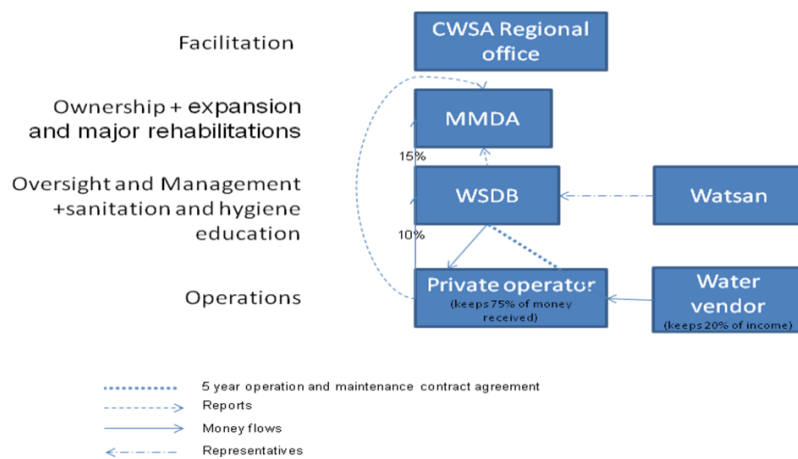


Figure 3-5: public-private partnership management model

This option has been piloted in Bekwai, Atebubu, Enchi and Wassa Akropong under a World Bank facility – PPIAF. Even though this option is mostly confined to these pilot systems, interest in the model is growing in the country among stakeholders owing to capacity issues confronting WSDBs in the management of the pipe systems and the complexity of the issues involved in running some of the bigger systems in bigger towns. Recently, few systems (in Yeji and Mim in the Brong-Ahafo Region, three district water supply in the Greater Accra and Volta Region, Tumu in the Upper West Region) have adopted this management model. In this option the DA/WSDB (on behalf of the ‘community’) contracts a Private Entrepreneur (PE) to manage the water system by undertaking the administration and technical management of the water supply services. The PE is expected to be more efficient in these functions than the WSDB. The contract agreement spells out the roles, responsibilities and obligations of the PE and WSDB. The DA is the regulator of the operations of the water supply services.

#### **4. CONCLUSION**

This report has given an overview of the main management models which are used to provide potable water to the population, including the poor, in urban and peri-urban areas and small towns. However, none of these models has adequately been documented to establish how successful or otherwise it is in terms of pro-poor service delivery. It is therefore suggested by the study that a case on each of these models is documented to bring out its success, failures and challenges for lessons to the TPP project.

## ANNEXES

### Annex 1: Production Capacities of 10 Biggest Supply Areas

Supply/Service Area	Description	Source SW/BH	Plant Design m3 / day	% on Total Capacity
Accra Tema Metropolitan Area/Dodowa	Kpong New	SW	181,818	
	Kpong Old	SW	38,636	
	Weija - Adam Clark	SW	134,000	
	Weija - Candy	SW	39,440	
	Weija - Bamag	SW	30,240	
	Dodowa	BH	2,400	
<b>R01-A1 Total</b>			<b>426,534</b>	<b>54%</b>
Kumasi	Barekese	SW	81,818	
	Owabi	SW	15,909	
<b>R02-A1 Total</b>			<b>97,727</b>	<b>12%</b>
Cape Coast	Brimsu	SW	29,500	
	Twifo Praso	BH	144	
	Baifikrom	SW	2,272	
	Winneba	SW	13,636	
	Kwanyanku	SW	13,636	
	Breman - Asikuma	SW	660	
<b>R04-A1 Total</b>			<b>59,848</b>	<b>8%</b>
Sekondi Takoradi	Daboase / Bosomase	SW	27,273	
	Inchaban	SW	18,144	
<b>R03-A1 Total</b>			<b>45,417</b>	<b>6%</b>
Dalun	Dalun / Nawuni (Tamale)	SW	19,560	
<b>R06-A1 Total</b>			<b>19,560</b>	<b>2%</b>
Obuasi/New Edubiase	Odaso / Obuasi	SW	19,344	
	New Edubiase	1xBH	160	
<b>R02-A4 Total</b>			<b>19,504</b>	<b>2%</b>

Ho / Dayi	Kpeve	SW	18,181	
	Kpedze	SW	109	
	Tsito	SW	263	
<b>R07-A1 Total</b>			<b>18,553</b>	<b>2%</b>
Bolgatanga	Bolgatanga	SW	8,160	
	Zuarungu	BH	690	
<b>R09-A1 Total</b>			<b>8,850</b>	<b>1%</b>
Sunyani	Abesim	SW	8,160	
<b>R08-A1 Total</b>			<b>8,160</b>	<b>1%</b>
Keta	Agordome	SW	7,273	
<b>R07-A4 Total</b>			<b>7,273</b>	<b>1%</b>
<b>TOTAL 10 systems</b>			<b>711,426</b>	<b>90%</b>
<b>TOTAL all systems</b>			<b>790,710</b>	<b>100%</b>

*Source: AVRL Database, 2007*