

UNIVERSITY OF CAPE COAST

MANAGING THE MAINTENANCE OF RURAL WATER SUPPLY
FACILITIES IN THE BUILSA DISTRICT

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

In Ghana, the issue of managing the maintenance of water supply facilities still remains a big problem in rural water provision. One of the recurring issues in rural water supply is how to ensure sustainability of water supply facilities. The main objective of this study therefore, was to examine the maintenance structures as they exist for the effective management of water supply facilities in the Builsa District.

The research was a non-interventional study, and using simple random sampling, five percent (5%) of the total number of hand-pump communities in the District were selected. The administration of questionnaires, in-depth interviews, observations and focus group discussions (FGDs) were used to solicit data from the field.

It was found that lack of cooperation or collaboration among stakeholders, inadequate logistic support, bureaucratic processes at the District Assemblies, lack of commitment and embezzlement of funds on the part of committee members, inadequate means of transport and lack or bad access routes to some of the communities, and high attrition rates were some of the major constraints. Additionally, poor financial mobilization and management did not guarantee readily available funds for pump maintenance and repairs.

The study therefore recommends the provision the requisite financial and logistical support for the DWST. Women, who are mostly the water users, should be empowered to play active role in the maintenance system.

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DEDICATION

To my father Mr. David Adeenze-Kangah.

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CHAPTER ONE

INTRODUCTION

Background to the study

The provision of safe and adequate water supplies for domestic and industrial use has often been used as a yardstick for determining the level of socio-economic development and health status of human communities. Clean drinking water has been a concern of development thinking for the past three decades. The Twelfth World Health Assembly initiated the Community Water Supply programme in 1959 with the aim of improving the supply of water in rural communities. By the end of 1970s the United Nations (UN) called for continued international efforts to bring water and sanitation to all the people in developing countries. In November 1980, the UN General Assembly designated the 1980s as the International Drinking Water Supply and Sanitation Decade. During this period, more than a billion and half people were provided with access to safe drinking water and nearly three-quarters of a billion were given access to sanitation (World Bank, 1992b).

Many governments and NGOs have strived to provide potable water supply to many communities in developing countries. This is evidenced by the numerous news reports on the commissioning of new Water Supply Facilities

(that is boreholes and wells fitted with hand-pumps) in developing countries. It is said that “Water is life” and the level of government commitment to the supply of potable water to as many communities (particularly rural communities) as possible cannot be underestimated (Ntow, 1997).

According to statistics from the World Health Organization (WHO), between 1971 and 1975, developing countries invested \$ 3 billion per year for the provision of potable rural water, an amount which has more than doubled in recent times. Despite this impressive progress, the goal of providing safe water and in some cases sanitation to all people in developing countries is far from being accomplished.

The United Nations Development Programme (UNDP) estimates that, about 1.1 billion of the world’s population lack access to safe water sources and as a result 13,000 people die every day from preventable water related diseases (UNDP 2006). The UNDP also asserts that by 2025, eighteen million (18,000,000) people will be living in countries and regions with absolute water scarcity and two- thirds of the world’s population could be under stress conditions.

The proportion of people without access to safe drinking water is significantly higher in rural than urban areas throughout the less-developed world. For example, 56 percent of people living in rural areas of Sub-Saharan Africa and 34 percent of those living in rural Latin America lack access, as compared to only 17 percent and 6 percent of their respective urban populations (UNDP, 2003). As global water scarcity grows, competition between users and claim of ownership of

water points will increase. Hence without effective management of water resources, tensions may rise both within and between countries.

The Millennium Development Goal (MDG) for water, agreed by the United Nations in 2000, is to halve, by 2015, the proportion of people without sustainable access to adequate and affordable safe drinking water. This goal will be much harder to achieve in rural areas than in urban areas in the developing world due to the low levels of existing coverage of water supply. This is further compounded by the fact that existing services demonstrate limited sustainability throughout the continent.

Harvey (2005) states that, 35 percent of improved rural water supply facilities in Sub-Saharan Africa are out of service at any given time. Unless sustainability levels can be improved the funding gap will only widen, the MDG target will never be achieved and rural populations will continue to be denied the basic human right to water.

As is the case in most parts of Sub-Saharan Africa, water demand far outstrips supply in Ghana. The main sources of water for households are piped supply from treated water sources, untreated piped water from groundwater sources, shallow boreholes, wells, ponds, springs, lakes, rivers, and streams.

In Ghana the percentage of the rural population with access to safe water at the start of the new millennium (year 2000) stood at 46.4 percent. This figure further increased in 2005 to 51.7 percent (Daily Graphic, 2007). The 2006 annual report of the Ministry of Water Resources, Works and Housing indicated that there was a further improvement in 2006, thus bringing access to safe water in

rural areas to 58.5 percent. The report indicated that improvement in access was attributed to the fact that, between 2001 and 2005 a total of 5,157 boreholes fitted with hand-pumps were drilled, while 854 hand-dug wells were provided in rural communities. In addition, in the 2006 fiscal year, 1,152 new boreholes fitted with hand-pumps and 39 new hand dug wells were also provided (Daily Graphic, 2007).

Much as the efforts of government and donor agencies at improving rural access to safe water must be commended, one major aspect of these water projects that is normally taken for granted is how to effectively manage the maintenance of the water supply facilities. Managing a rural water supply successfully means operating and maintaining a water system on a day-to-day basis so that the system continues to function and supply water as planned. There is evidence that the majority of water supply projects function poorly two to three years after their construction, hence forcing the people to return to their traditional unwholesome water sources (Kendie, 1992).

The construction of water supply facilities was previously based on the 'supply driven' approach. The 'Supply Driven' Approach (The system where communities neither apply nor pay for the facility and is not also responsible for maintenance of the water facility-CWSA, 2003) was adopted after the first ever United Nations' (UN) Water Conference held at Mar Del Plata, Argentina in 1977. The Water Conference resolution stated that: 'All people have the right to access drinking water in quantity and of a quality equal to their basic needs'. This conclusion led to the decision by the UN to establish the period from 1981-1990

as the International Drinking Water Supply and Sanitation Decade. The aim of the decade was to supply everyone on earth with a minimum of safe drinking water by 1990, hence the Supply Driven approach (Water Technology International-WTI, 1992). This approach was aimed at providing adequate water supply in both rural and urban settlements with or without the request for the facility by the beneficiary communities. The 'Supply Driven' approach of rural water supply did not involve beneficiary communities in the planning, designing and construction or installation of the facility. Rural water systems under this approach were provided without beneficiaries contributing to the capital and the operation and maintenance (O&M) costs or these projects were highly subsidized by the state (Khan, 1988; Ayibotele, 1988). Under the supply driven approach, the central government was responsible for the construction and maintenance of water supply facilities in rural communities with very little or no contribution from the beneficiary communities. This system of management failed because, as stated earlier, beneficiary communities were not involved in the planning, implementation and management of water projects and hence lacked the sense of ownership of the facility.

Furthermore, the centrality of women as the collectors and users of water is recognized by most development agencies, but the centrality of the role of women to the planning, designing, construction, operation and maintenance strategies is not always recognized (Essaw, 2001). Thus, community members saw the provision and maintenance of the water supply facilities as the sole responsibility of the government, donor agency or NGOs. This led to poor

maintenance of water supply facilities since, most of the time, the people put in charge of the maintenance are not directly involved in the collection of water or do not use the facility.

The main question then is how do rural communities build and maintain their communal capacity to generate adequate income and to manage cash flows such that the water supply facility can be self-sustaining? This has led to debates as to whether rural water supply facilities should still be managed by the government or whether it should have a considerable amount of local autonomy (that is management by beneficiary communities).

Thus, since the 1990s, Community Management has become the acceptable strategy for ensuring sustainable water supply and sanitation schemes. The Community Management Approach (CMA) allocates responsibility for ongoing management of water supply to the community of users. This means that the community, usually by means of a water committee or alternative Community-Based Organization (CBO), is responsible for managing maintenance activities to ensure that the water service continues to operate on a sustainable basis.

The process of restructuring and transformation of the water sector in Ghana began with the establishment of the National Rural Water and Sanitation Committee which was commissioned to look into the sector and come up with solutions or recommendations that will help solve the problems the sector faced at the time (CWSA, 2003). Based on the recommendations of the National Rural Water and Sanitation Conference held at Kokrobite, Accra in May 1991, a

Community Water and Sanitation Division (CWSD) was established within the then Ghana Water and Sewerage Corporation in March 1994 (CWSA, 2003). The establishment of the CWSD followed the signing of an agreement between the Government of Ghana (GoG) and the International Development Agency (IDA) of the World Bank, which represented the interests of external development partners. The CWSD became a semi-autonomous entity known as the Community Water and Sanitation Agency (CWSA) after a bill was approved in Parliament in the last quarter of 1998 and president assent given on 30th December 1998 (CWSA, 2003).

The CWSA was set up to facilitate the process of implementing a National Community Water and Sanitation Programme (NCWSP) which was launched in 1994. By the implementation of the NCWSP there was a de-linking of urban and rural water supply in Ghana. Urban water became the responsibility of the Ghana Water Company Limited (GWCL). Rural water and sanitation issues were also put under the CWSA.

The overall goal of the NCWSP was to increase water and sanitation facilities in the rural areas of Ghana based on a 'Demand Driven Approach' (This is the system where communities demand for water facilities of their choice. The demand should be backed by the communities' ability to pay for their part of the total cost of providing the chosen facility. The approach also recommends that communities should be responsible for the maintenance of these facilities once provided-CWSA, 2003). The specific objectives were to:

- provide basic water supply and sanitation to communities that will contribute towards the capital cost and pay the normal operations, maintenance and repair cost of their facilities;
- ensure sustainability of these facilities through community ownership and management, community decision-making in their design, active involvement of women at all stages in the programme, private sector involvement in the provision of goods and services and the public sector promotion and support; and
- maximise health benefits by integrating water, sanitation and hygiene education intervention, including the establishment of hygiene education and latrine construction capabilities at the village level (CWSA, 2003).

Actual implementation of the NCWSP was in two phases. The first phase (Community Water and Sanitation Project-1) was implemented from 1994 to 2000. The Project (CWSP-1) was a long-term investment program funded by International Development Agency (IDA). It was initiated in 1994 to support the National Community Water and Sanitation Strategy and Action Plan, which is the product of a national policy reform project to improve the quality of water supply and sanitation in rural areas and small towns. The CWSP-1 was intended to complement the existing activities of the central government water authority, which now focuses on building larger systems. Initial project objectives were to provide capacity to meet community demand for water and sanitation in 500 rural

communities and 30 small towns on a sustainable basis through a combination of government, private sector, and community decision making and management.

In brief, CWSP-1 supports the creation of a professionally managed Community Water Supply and Sanitation agency (the Community Water Supply Division-CWSD), which is autonomous from the existing national government water agency (CWSA, 2003). The CWSD supports regional and local Water Supply and Sanitation (WSS) units. The regional WSS teams (regional water and sanitation teams-RWSTs, which are regional bodies of the CWSD and independent of the WSS) train and help manage the procurement process as local technical units (district water and sanitation teams-DWSTs) are developed.

Finally, the CWSP-1 supports the development of community WSS organizations (WATSANs and Water User Groups-WUGs). In addition to supporting governmental capacity building, the CWSP-1 supports developing private sector capacity for designing, constructing, and maintaining rural WSS systems; developing NGO capacity to facilitate community mobilization and develop private and public sector capacity; and developing the capacity of households and communities to articulate demand for WSS and to operate and maintain these systems. Community mobilization and capacity building was structured in a way that, the CWSD works with local government to create District Water and Sanitation Programmes (DWSP), which are technical units at the local government level that support community-based water organizations.

In 2000, the second phase of the National Community Water and Sanitation Project (CWSP-2) was initiated with support of a World Bank IDA

credit of US\$21.9 million. The project built on lessons learned from the first Community Water and Sanitation Project (CWSP-1), and adopted a large scale decentralization approach in the planning, implementation and management of water supply and sanitation (WSS) services in Ghana. The development objective of the CWSP-2 was to increase access and achieve effective and sustained use of improved community WSS services in villages and small towns in Ghana.

The CWSP projects were aimed at solving the problem of water scarcity and the sustainability of water supply facilities in rural Ghana. However, after close to fifteen (15) years of the implementation of the 'Demand Driven' Approach, the issue of managing the maintenance of water supply facilities still remains a problem in rural water provision.

Problem statement

One of the recurring issues in rural water supply in Ghana is how to ensure sustainability of water supply facilities. Inadequate maintenance funding has been one major factor accounting for the lack of sustainability of the majority of the rural water projects in the third world. On the other hand, Kendie (1994) opines that free and highly subsidized water policies have had negative consequences for operational sustainability. This factor is partly responsible for the inadequate maintenance of existing water systems in Ghana.

Sam (1995) observes that schemes such as the provision of boreholes and wells fitted with hand-pumps are often expensive. In 1995, the installation of one borehole in the Upper East Region could cost anywhere between 2,400 and 3,000

Ghana cedis (Sam, 1995). By 2005, the cost of installing a borehole or well fitted with hand-pump was about 7,500 Ghana cedis (CWSA, 2006). It is therefore important that such an investment, often funded by government and donor agencies is properly managed to ensure the sustainability of water supply by these facilities.

The Builsa District has 225 boreholes, 46 wells fitted with hand-pumps and 218 open wells (Builsa CWSP, 2006). The management of these water points has been mainly community-based. Thus, the management of the water facility is the sole responsibility of the community with little or limited support from the District Assembly. To ensure effective community management, the facility implementing agency (usually donor agency, government or NGO) together with the District Assembly usually select and train water and sanitation (WATSAN) committees and facility care takers (comprising a male and a female) in each community. The WATSAN committee and care takers are then entrusted with the day-to-day maintenance of the facility. Sustainability is normally the main goal and communities were also educated to be self-reliant in the maintenance of their water supply facilities.

However, after several years the problem of managing the maintenance of these water supply facilities still exists in the region particularly the Builsa District. According to the 2003 Community Water and Sanitation Report of the Builsa District, about 43 percent of the hand-pumps and bore holes in the district were either not functioning or recorded a poor performance rate. The consequence is communities returning to the use of their old unwholesome

sources of water whenever there is a break in service from the boreholes and wells. Such conduct negates the health and socio-economic objectives upon which such water projects were executed.

It is therefore hypothesized that the success or otherwise of managing the maintenance of rural water supply projects should be assessed on the basis of the institutional structures put in place to ensure sustainable water supply. The concern of this study, therefore, is to examine the maintenance structures as they exist for the effective management of water supply facilities in the Builsa District of the Upper East Region of Ghana.

Objectives of the study

The main objective of the study is to assess the management arrangements for the maintenance of rural water supply facilities in the Builsa District.

The specific objectives of the study are to:

- Assess the capacity of the institutions involved in the maintenance of rural water supply facilities in the Builsa District;
- Determine the level of community involvement, especially women, in the process of managing the maintenance of the water supply facilities;
- Assess the willingness of communities to pay towards the maintenance of the water supply facilities;
- Examine the funding system as it pertains for the maintenance of the water supply facilities; and

- Make recommendations for the effective management of the maintenance of rural water supply facilities in the district and in Ghana as a whole.

Research questions

- What is the capacity of the institutions available both at the district and community levels for effectively managing the maintenance of water systems?
- What is the level of participation of communities in the management of the maintenance strategies put in place?
- How are communities involved, particularly women, in the planning, designing and implementation, including monitoring and evaluation of management systems for the effective maintenance of the water supply facilities?
- What is the level of community members' willingness to pay for the maintenance of the water supply facilities?
- What funding sources are currently employed for the maintenance, and what are the alternative sources of funding available?

Relevance of the study

Firstly the study presents information on managing the maintenance of rural water supply facilities in the Builsa District of the Upper East Region. Information gathered from the study on the situation in the district will be useful

by the district Community Water and Sanitation Agency, the District Water and Sanitation Team, the District Assembly and Non-governmental Organizations working in the rural water sector particularly in the Builsa District, and will lead to policy formulation and a review of their management strategies.

Secondly, the information also provides a basis for evaluating the activities of the Community Water and Sanitation Agency, the District Water and Sanitation Team, NGOs and the contributions from beneficiary communities in the district. The study helps provide practical solutions or remedy to the problems of managing the maintenance of rural water supply facilities particularly in the Builsa district.

Finally, the study is useful for academic purposes, by way of providing a platform for discussion and learning by students in the area of managing the maintenance of rural water supply facilities. It will form a baseline for further research to be carried out on managing rural water supply facilities in Ghana and beyond to ensure sustainability of rural water projects.

Scope of the study

The study focused on managing the maintenance of rural water supply facilities in the Builsa District. The hand-pump communities (a community in which a group of people less than or equal to 500 are provided with a borehole or a well fitted with hand-pump-CIDA, 1987) and institutional contribution to ensuring the maintenance of water supply facilities as well as the mode of

financial mobilisation and financial management for pump maintenance and repairs were the focal points of the study.

Limitation of the study

The major limitation was the distances and poor road network between the traditional divisions sampled for the study. The hand-pump communities were several kilometres apart from each other with poor road networks, and hence resulted in a high cost of transportation in terms of fuel and maintenance cost to run the motor bikes used on the field.

Organisation of the study

The study is presented in seven chapters. The first chapter contains the background to the study, the problem statement, objectives and research questions. The chapter also includes the scope and limitations of the study, significance of the study, and the operational definition of key terms used in the thesis.

Chapter Two covers the review of related literature to the topic under study. It is subdivided into the importance of safe water supply, types of community water management and maintenance, willingness to pay for water supply by rural communities, managing the maintenance of rural water supply facilities in Ghana, and a problem tree analysis (PTA).

The third chapter covers the methodology adopted for the study. This chapter includes the study area, the study design, the study population, sample

size and sampling procedure, data sources and instruments of data collection, and data analysis and presentation.

Chapter Four discusses the evolution of rural water supply in Ghana, whilst Chapter Five contains the structure of rural water supply management in the study area (Builsa District). Chapters Six assess the institutional and hand-pump community participation in water supply facility management. Finally, Chapter Seven presents the summary, conclusions, and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter seeks to review related literature relevant to the study. It has five (5) major sub-areas, which begins with the importance of safe water supply to humans. This is followed by the types of community water management, maintenance and management, and willingness of rural communities to pay (WTP) for the provision and maintenance of water supply facilities. The final aspect of the chapter covers managing the maintenance of rural water supply facilities in Ghana.

Importance of safe water supply

The earth is often called the “Blue planet” because three-quarters of its surface is mainly covered with water (Churchill et al, 1987). Water is a major natural resource (one of the big three; land, air and water) that is used in many ways-for example, as a nourisher of plant and animal life, a bearer of food, a prime element of industrial processes, and a medium for transportation. The importance of water can be put into perspective by the fact that a significant portion of the earth surface is water (www.USAID.gov.au/keyaid/water.cfm).

The well-being of any community both rural and urban depends on the availability of good clean water which is an essential economic, social and biological ingredient needed for human consumption and survival. Water is also used by industries as a raw material and as a coolant. Thus, without adequate supply of potable water, all human activities will be frustrated and as a consequence overall economic and social development would be affected. Water for human consumption and sanitation is of vital importance because the effect of ill-health of the population will have a repercussion on other human activities.

Ntow (1997) opines that improvement in water supply can result in health, economic and social benefits. On the health benefits, he states that improved water supply reduces infant mortality rate and increases life expectancy. This consequently results in significant benefits to the individual and society as a whole since there is considerable savings in medical treatment (including costs of medicines), travel costs, income and time. Economically, he realized that improved water supply provides opportunities for business, agriculture (e.g. keeping livestock) and fire fighting. Finally, he noted that easier access to safe water can improve family and social development. Women will spend little time in fetching water and therefore have more time for child care and income generating activities. Further, children will have enough time to go to school, hence reducing child absenteeism and school dropout rate.

Safe drinking water and basic sanitation are crucial to the preservation of human health, especially among children. Water-related diseases are the most common cause of illness and death among the poor of developing countries.

According to the World Health Organization (WHO), 1.6 million deaths of children per year can be attributed to unsafe water and poor sanitation. WHO estimates that 80 percent of endemic disability in developing countries is due to diarrhoea related diseases. A review by WHO demonstrates that improvement in water supply has direct and significant pay-off in reducing diarrhoea morbidity by 37 percent. It also reduces infection from the guinea worm disease by 85 percent and even up to 96 percent in some areas of rural Togo, Burkina Faso, Nigeria, and Mali (Hopkins and Richards, 1984). In Ghana, the upsurge of the guinea worm disease in the 1980s and much recently, has rendered many people in the affected communities bedridden and non productive.

With Ghana being predominantly an agricultural economy and about 70 percent of the total population living in the rural areas, the health of rural people is the primary concern of government. Without good health of rural population it will not be possible to achieve any progress in the agricultural sphere, where sheer physical labour is the primary requirement (Hart, 1994). Water plays an important role in making the health of a person. Therefore provision of safe and potable drinking water is the chief requirement of the rural population for maintaining good health. It will go a long way in improving the health of people. The use of contaminated water for drinking purpose is one of the major causes of gastrointestinal diseases. Also water has been found to be the major carrier of pathogenic organism resulting in a wide range of diseases like typhoid, bacillary and amoebic dysentery diarrhoea, cholera and jaundice to the consumers of contaminated water (Hart, 1994).

Epidemiological surveys carried out in various parts of Ghana indicate that the incidence of water borne diseases in rural areas is very high due to the use of contaminated water. As a result of the presence of excessive solids, hardness, fluorides and iron in the underground water in many villages, the portability of water has been adversely affected (Hart, 1994).

Allied to the health benefits, a water supply programme has the potential to act as a catalyst for economic growth. Better access to clean water and sanitation services offers tremendous opportunity for the poor and is a progressive strategy for economic growth. Investing in water management and services is absolutely essential for the eradication of poverty and is a necessary condition for enabling sustained economic growth (Stockholm International Water Institute, 2005). The poor gain directly from improved access to basic water services through improved health, averted health care costs and time saved. Good management of water resources brings more certainty and efficiency in productivity across economic sectors and contributes to the health of the ecosystem. Taken together, these interventions lead to immediate and long-term economic, social and environmental benefits that make a difference to lives of billions of people (Stockholm International Water Institute, 2005).

In Ubay (a district) in the Philippines, a small amount of start-up capital earned through a water project enabled half of 14 Water Associations in the area to start the operation of their own income-generating projects including rice trading, emergency loans, micro-lending and equipment rentals (Essaw, 2001). An analysis by WHO found that achieving the Millennium Development Goal

number 7 “of ensuring environmental sustainability” would bring substantial economic gains: in that each USD 1 invested in potable water supply would yield an economic return of between USD 3 and USD 34, depending on the region. Households with improved services suffer less morbidity and mortality from water-related diseases. The benefits would include an average global reduction of 10 percent in diarrhoeal infections. Health-related costs avoided would reach USD 7.3 billion per year and the annual global value of adult working days gained as a result of less illness would increase to almost USD 750 million.

Better services resulting from the installation of water supply facilities closer to user communities, the installation of piped water supply in houses, and latrines closer to homes would reduce drastically the time spent in collecting water and using sanitary facilities. Girls and women have better educational and productive opportunities when they have water and sanitation facilities nearby, because they can safeguard their privacy in school and save time used in fetching water. The availability of water can be used to start or expand small enterprises and thus increase disposable household income.

Providing reliable and sufficient water supplies is critical for the growth and development of small scale local industries in rural communities. For instance, the availability of reliable water supplies in most rural communities in the Upper East Region of Ghana has paved way for improved and increased production of shea butter and other economically viable businesses such as pito brewing and pottery to mention but a few.

Among the world's poor countries in Africa and Asia, those with access to improved water services experience greater economic growth. Poor countries with improved access to clean water and sanitation services enjoyed annual growth of 3.7 percent. However poor countries with the same per capita income but without improved access had an average annual per capita GDP growth of only 0.1 percent (SIWI, 2004).

It is based on the valuable importance of safe drinking water that various governments of Ghana in collaboration with donor agencies and non-governmental organizations continue to invest in the provision of safe water in the country. For instance, since the inception of the Community Water and Sanitation Programme in 1994, there have been about 45 NGOs sponsoring water and sanitation projects in the country and contributed a total of about USD 515,464 (GH.¢ 500,000) to the water sector in 1997. From the year 2000 to 2007, the number of NGOs in the water sector and the amount they are contributing have increased tremendously thus increasing the level of access to safe water in rural communities in the country (Daily Graphic, 1998).

However, these efforts have been negated in most rural communities in Ghana due to the frequent breakdown of water supply facilities particularly boreholes and wells fitted with hand-pumps, thus rendering the affected consumers with no other source of water than the unwholesome sources of water. Water supply facilities will be able to deliver services to meet the objectives for which they are constructed if they are managed and maintained effectively.

Types of community water management

There are different types of water system management. A water system might be one hand-pump in a village or might be a complex gravity system (Essaw, 2001). Garvey (1993) identifies three main ways in which community water supply facilities can be managed. These are; agency managed, agency/community managed, and community managed systems.

Agency managed technique

This technique of community water management is normally associated with a government water agency. Here, the government water agencies bear the responsibility of the construction and management of the water supply facility on behalf of the user community. In some countries, the agency is the legal owner of all rural water schemes and is responsible for the management of these schemes (Saunders and Warford, 1976). This approach of rural water supply commonly known as the 'supply driven' was adopted after the United Nations (UN) water conference held at Mar Del Plata, Argentina in 1977. The approach aims at providing adequate water supply in both rural and urban settlements. Under this approach, "rural water systems are provided without beneficiaries contributing to the capital and the operation and maintenance (O&M) costs or these projects are highly subsidized by the state. The central government is responsible for the construction and maintenance of water supply facilities in rural communities with very little or no contribution from the beneficiary communities" (Kendie, 1994 p.1). However, Garvey (1993) observed that many government agencies have

problems in managing water supply facilities successfully particularly in rural communities. This can be attributed to the following factors which in all four cases are very peculiar to the Ghana Water Company Limited and the Community Water and Sanitation Agency of Ghana.

Firstly, the agencies face the problem of a shortage of serviceable vehicles to carry out their responsibility of ensuring effective operation and maintenance of water supply facilities. The shortage of vehicles is due to a number of factors which include shortage of spare parts to service vehicles; also donor agencies are more inclined to supply vehicles for the implementation stage of a water project than for operation and maintenance; government agencies lack the culture of maintenance of vehicles, and maintenance work of water supply facilities usually involve driving on poor roads to sometimes distant rural communities which breakdown vehicles very rapidly.

Secondly, there is the shortage of pump spare parts and tools which normally result in long breakdown periods and, in some cases, the abandonment of the facility. This is normally caused by insufficient consideration by donor agencies of long-term spare parts supply. Also, the lengthy bureaucratic nature of government agencies makes it very difficult if not impossible to purchase spare parts on time.

Thirdly, lack of motivation and low salaries in government service often diminishes the enthusiasm of maintenance crews to carry out field work. In the instance of a rural bore hole, the community would report breakdowns to the local Water Supply and Sanitation Agency (WSSA) regional office, which then

dispatch a repair crew to repair the pump. However, in most cases it takes several weeks before a maintenance crew would arrive to repair the borehole or water supply facilities.

Finally, the centralized system of maintenance which was mainly managed by the then rural water department posed a serious problem in the collection of levies for maintenance. This was attributed to the fact that, communities were not involved in the planning, designing, and construction of the water projects, and thus reduced communities' commitment to ensure the maintenance of the facility by way of paying levies to the government agency responsible for maintenance of the water supply facility (Garvey 1993).

Agency/community-managed water supplies

The Agency/Community-Managed water supply is an approach in which the management of the water supply facility is a shared responsibility between the government and the local community (Saunders & Warford, 1976). According to Garvey (1993), the community plays an active role in managing the system but does not own the facility. Major repairs and decisions affecting the future of the facility are in the hands of the agency (government or NGO) which built the water supply facility.

The Agency/community managed approach allocates responsibility for ongoing management of water supply to the community of users. This means that the community, usually by means of a water committee or alternative Community-Based Organization (CBO) normally set up by the agency, is

responsible for managing minor maintenance activities to ensure that the water service continues to operate on a sustainable basis. Agency/Community management of O&M is based on the following key principles:

- the user community does not own the water supply facility since it is exclusively constructed by the agency;
- the user community sets and collects water tariffs to finance O&M;
- the user community manages and finances operation, maintenance and repair activities; and
- the government (or implementing agency) provides support to the community (Harvey, 2005).

The community of Dulecha in southern Ethiopia represents a classical example of this type of management approach. The people had a borehole and a distribution system which was managed by the community with the support of the Water Supply and Sanitation Agency (WSSA). A water committee was formed with the help of the WSSA extension agents based on the guidelines of WSSA for community management (Essaw, 2001). Proceeds from the water were used to pay the pump operator and water point attendant. The water was sold by the water point attendant at the stand post at a tariff fixed by the WSSA. The revenue was given to the treasurer of the water committee whom together with the chairman were responsible for the purchase of diesel for the pump and payment of the two employees. Under an arrangement between the community and WSSA, 40 percent of all profits from the sale of water went into a maintenance fund to ensure that

there were always funds available in the event of a breakdown of the water facility (Essaw, 2001).

This management approach adopted by the people of Dulecha could only work a few years after its implementation, because developing and managing community water supply facilities yield only marginal profits. The reason for the low profit level is attributed to the low tariff and income levels of rural dwellers. Firstly, beneficiary communities may be deterred from patronizing water from the new and safe water facility due to the tariff they are required to pay upon usage of the facility. They would rather prefer to fetch from their unwholesome sources for free and use their very limited incomes for goods and services they cannot get free of charge. Secondly, the tariffs charged are normally very low to equivalent the income status of the people. This results in the inability of the water committee to raise enough funds for the maintenance of the facility and the salaries of paid staff of the project, hence, the collapse of the project.

Community-managed water supplies

Since the 1990s, the Community-management approach has become the dominant and standard project management strategy for the development of the water supply and sanitation sector (Kendie, 1994). The New Delhi Global Consultative Conference on Safe Water held in 1990, to review the International Drinking Water Supply and Sanitation Decade, endorsed community management as one of the guiding principles for rural water and sanitation delivery (Najilis & Edwards, 1991). According to the United Nations Development Programme

(UNDP, 1990), this really marked the official birth of the community management paradigm.

The new approach was found in concepts of self-reliance and community action that had begun to be popularized under the phrase 'small is beautiful' (Schumacher, 1973). Small is beautiful was to become one of the key-slogans of the water and sanitation sector. It came along with a shift in focus to small NGO led projects, in which users were encouraged to take an active role in terms of providing inputs, labour or cash, to the development of simple, low cost systems. This was the basis of the 'community participation' model that was to remain an acceptable practice for much of the rest of the decade.

McCommom (1990) define community management in terms of its three broad dimensions, namely responsibility, authority and control. According to them, the principle of responsibility confers ownership of the system with all its management requirements on the community. The community thus feels responsible for the maintenance and repairs, regulating usage and financing water supply and sanitation facilities. By authority, the community has the legitimate right to make decisions about the system regarding technology choice, service levels, form and composition of local organization, usage regulation and financing mechanisms. Control implies that the community has the power to determine outcomes and to implement its decisions regarding the system. Community management, in this sense, therefore means that beneficiary communities have the responsibility, authority and control over the construction as well as the operation and maintenance of their water supply and sanitation systems.

Evans and Appleton (1993) offer an incisive exposition of the processes that are likely to make community management successful in this dimension. These are efficient community decision making processes, community responsibility backed by legitimate authority and effective control, community mobilization of resources, community access to external support (public or private) to supplement local management capacity and agency acting as facilitator and supporter and helping to build community self sufficiency (Kwashie, 2007). For instance, the Murugi-Mugomango water society in Kenya developed from small self-help groups and relied upon advice and support from a variety of external agencies. They signed an agreement with an NGO who agreed to offer financial support to the society in the extension of the water distribution system. Members of the beneficiary communities contributed their quota by offering labour for sixty (60) days during the construction period. To ensure an efficient management of the water supply facility, the society had its own constitution and is run in a business-like manner, with the sole objective of making small profits. The society also conducts elections every two years to elect its management committee members. It is important to note that during the construction stage, the Kenyan government provided technical advice and funding. In addition, the international NGOs held training courses for the management committee members in financial accounting, record keeping, planning and management. Committee members have the chance of being re-elected based on their performance since they serve as representatives of the people (Essaw, 2001).

The community management approach brings many benefits. It has been seen as an answer to the failure of previous supply-driven approaches to providing RWS services, which often did not meet the real needs of users and resulted in systems which broke down far earlier than the end of the design life. There is now a growing body of evidence to suggest that better quality participatory planning and management leads to better performing community water supplies (Narayan, 1995).

However, community management is by no means a problem free method of rural water management. Despite strong investment in capacity building in many projects, a significant number of systems still run into problems. Widespread evidence suggests that after a number of years of operation (less in some cases), many rural systems will face a variety of problems and obstacles if they are to maintain services, even under the community management approach (Harvey, 2005).

Broadly speaking we can identify two sets of factors that can lead to problems for community-managed rural water systems:

- Limitations within the community: community dynamics, political or social conflict, failure to generate sufficient tariff revenue, lack of preventative maintenance, lack of cohesion and lack of capacity (technical, managerial, financial etc).
- Constraints external to the community: poor designs, poor implementation, political interference in planning and resource allocation, lack of spare parts supply, lack of supportive policies and

legislation and, very importantly, the lack of long term support to help communities through major repairs, conflicts and other problems with extension and upgrading.

It is now increasingly recognised that the majority of communities will be unable to manage their own water supply systems without some form of external assistance. Even with improved approaches focusing on increasing management capacity, it is simply not realistic to expect rural communities to be completely self-sufficient, especially in the first years after the systems have been constructed. This growing recognition of the limits to community management is based on field experience from a wide variety of practitioners and organisations around the world (Schouten & Moriarty, 2005).

This issue was widely discussed in the electronic conference on scaling up community management of Rural Water Supply (RWS) hosted by IRC in 2002. A useful concept emerged for explaining the limits of community management and the need for external support to community-managed RWS systems. This considers the limits of the community management approach in the following way: rural communities can be expected to handle about 80% of what is required to sustain their systems, but will always need assistance with the remaining 20% of tasks. The percentages are arbitrary and the split will vary by country and region and will depend upon the technology and general levels of organisation within communities, amongst other factors, but this is a useful way of conceptualising the problem. These notwithstanding, rural communities should be able to carry out tasks such as regular preventative maintenance, tariff collection,

book-keeping and sanitary inspections. However, when there are major repairs, where specialised tools or major system components are required, or where there is a breakdown of the management structure, some level of external assistance will usually be required.

External assistance or support is best provided by local government institutions or other Non-Governmental Organisations (NGO) or stakeholder groups. This may be a district water and sanitation team including water, environmental health and community development staff (Harvey, 2005). External Support Agencies (ESAs) should work in partnership with government institutions from the onset of programmes. The capacity of institutions must be considered for them to fulfil a support role effectively, and institutional strengthening may be required (Harvey, 2005).

Effective institutional support has a significant but moderate financial cost associated with it. Consequently, both national and decentralized government institutions must budget for this accordingly. There is little point increasing service coverage through investment in new water systems if there is insufficient investment to ensure that existing systems are sustained (Harvey, 2005). This financial support may be viewed as a subsidy for rural water services, but is significantly lower than most subsidies for urban water supplies.

Maintenance management

Managing the maintenance of a water supply facility is an integral part of the project operation irrespective of the management system adopted (Cusworth

& Franks, 1993). According to Hofkese (1983), small community water supplies are often more difficult to be kept running or functioning than to construct. Since planning, design, and construction of a water supply facility affect its operation and maintenance, these needs and concerns must be incorporated into the planning, design, and construction efforts. Facilities (primary and support) should be designed using appropriate technology necessary to meet their functional needs. Simplicity of design and construction will reduce maintenance costs and maximize operational efficiency for the beneficiary community. Materials chosen should meet all local and national occupational safety and public health service guidelines for health and toxicity standards (Hart, 1994).

It is therefore recommended that, maintenance of access to water supply facility should limit vehicular use and travel, minimize environmental impacts on the site, and be non-disruptive to the functional operation of the development (Hart, 1994). For the original design to retain its high quality, facility maintenance must have the highest quality standards. The true test of a successful maintenance programme is through the perceptions and reactions of the users. With a design based on sustainable technological systems and material selections, an acceptable facility maintenance programme should centre on the following:

- understanding and interpretation of original design elements that must be repaired or replaced over the life of the facility,
- development of a maintenance management system for daily and long-term operations that minimizes environmental impacts,
- training and development of a local work force, and,

- the use of skilled artisans who provide or instruct maintenance employees in traditional methods of construction to reflect and enhance local cultural values, facility maintenance, and operations.

Facility managers must be encouraged and trained to look beyond daily maintenance operations of the water supply facility, particularly in rural communities. For example, managers must anticipate and accurately predict component replacements, since shipping and delivery of small orders are subject to delays, consume energy, and disrupt operations (Hart, 1994). Technical training should begin in the early phases of design and construction, and facility providers should provide hands-on training in preventive and cyclic maintenance before the water supply facility is handed over to the community.

However, an essential goal of a quality, well-maintained sustainable water facility should be the hiring and training of the local population. During design and construction, individuals who excel in local artisan skills and show leadership potential should be identified. Upon completion of initial construction, the most qualified local artisans should be recruited and trained for future maintenance manager positions. The concept of total absorption of individuals into the design, construction, and maintenance steps constitute sustainable personnel use, which complement sustainable development. Hence a maintenance employee who was involved in initial design and construction would be likely to show a high level of pride in maintaining the facilities to the highest possible levels of quality (Batir, 2007). Each employee should be cross-trained in major maintenance categories. The stratification of specialist employees should be avoided. Maintenance

employees should be trained in interpretive skills and present demonstrations that reflect their skills. Maintenance uniforms should reflect use of cultural clothing. Hart (1994) observes that families of maintenance personnel should be encouraged to visit the workplace to develop a sense of pride in ownership and workmanship. Parents should be encouraged to pass along artisan skills to children, who in turn would eventually become multi-skilled.

Dissimilar to the aforementioned, Kerr (1989) observed that much attention has often been focused on the investment stage of water supply facility. Many professionals prefer to work on this stage due to the extensive rewards associated with this stage. Moreover, the returns to funds invested at the implementation stage can generally, in theory at least, be calculated while the calculation on the maintenance cannot be made frequently (Essaw, 2001). This negatively affects maintenance and sustainable operation of water facilities since long term management policies are not incorporated in the planning and implementation of the water facilities.

Saunders and Warford (1976) suggest that maintenance demands skilled personnel, both at management and operational levels. In order to ensure the efficient maintenance of the water system, there should be sufficient training for personnel and efficient financing systems to manage these facilities. Gershon and Moigne (1999) suggest that ensuring sustainable water supply requires a form of funding system to generate funds for maintenance in the long run. This is attributed to the fact that the operation, maintenance and management of water supply facilities require the availability of financial supplies.

Table 1 shows the various financing options endorsed by the World Health Organisation (WHO) for effective operation and maintenance of water supply facilities.

Each financial option is being applied under a particular unique circumstance, and for a particular purpose. Further, there are agencies, committees and institutions to ensure that, whatever option of financing chosen by the community is effectively implemented in conformity with the laid down procedure of implementation. This approach of financing rural water facilities guarantees the availability of funds for the effective maintenance of rural water supply facilities.

Table 1: Financing options for rural water supply facilities

Option	Circumstance	Purpose	Implementer	Procedure
Voluntary funds	In communities with a tradition of fund raising: seasonal income	Financial contribution to financing construction and maintenance	Traditional leadership, voluntary groups	Targets are set and funds collected periodically through bazaars
General community	In communities with own source of income and a water supply with public facilities	Annual maintenance and repair, constructions, depreciation and expansion where possible	Local government, water committees	Funds collected based on net annual income of community and costs, income generation
Cooperative funds	Water supply initiated and financed by village cooperative or revolving fund, no direct payment for water used	Annual maintenance and repair, payment of construction loan, depreciation and expansion where possible	Cooperative, water committees	Funds based on cooperative income, dues, costs, income generation where possible
Flat rates	Families have private taps or share taps with well defined social group, have fairly reliable income and benefit equally	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible	Water committee, local government	Rates determined by agency and approved by users, administered by local water committee
Graded rates	In communities with appreciable differences in water use and benefits with sufficient community spirit to share households into payment categories	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible	Water committees, water agency, local government	Rates graded using local indicators of water use and wealth; users sharing taps pay less

Table 1 (Continues)

Mixed systems	In communities with large differences in payment capacity and water use, and with high/low income households	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible	Water agency, water committee	Funds from private taps used to subsidise costs or taps in poorer sections
Water metering	In large communities with limited water resources and an efficient administration	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible	Water agency, water committee	Meter reading, billing and rate collection by separate workers
Vending	In communities where a socially valuable vending system can be implemented	Contribution towards financing recurrent costs for agency and vendor services, including upkeep of hygiene and simple repairs	Water sellers cooperatives, water agency paid operation	Water sold from metered taps at controlled prices
Direct and indirect taxes	In communities where taxation can be related to water use and costs	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible	Local government	Taxes to finance basic services; categories of payment dependent on the level of service
Seasonal rate	In communities dependent on rain fed subsistence agriculture and with marked seasonal variations in income	Repayment of community loan for construction, maintenance and repair, depreciation and expansion where possible; major repairs subsidised	Water committees, women's groups, men's age sets, other local groups	Payment made in the season when villagers can afford when harvest is in; payment in kind where possible

Source: Kendie (1993)

Willingness to pay for water in rural communities

Willingness to pay (WTP) is the amount an individual is willing to pay to acquire some good or service (UNEP, 1995). Thus, the willingness to pay for water in this context refers to the amount an individual, household or an entire community is willing to pay to acquire portable water supplies.

A decade after the international Dublin and Rio conferences of the early 1990s, the economic value of water gained greater recognition, hence, many developing countries have been struggling to implement higher cost recovery policies in rural water supply (RWS) programmes. Even though many countries have accepted the principle that the poor were willing to pay for good quality services and therefore should be made to pay for water, a long history of RWS subsidization posed significant challenges in implementing this policy (Kendie, 1994). In China, however, during the same period and away from the fanfare of international declarations, partial user-financing in RWS had already been implemented for many years by the government (Littlefair, 1998). Furthermore, the World Bank-assisted rural water supply and sanitation lending programme, which started in 1985, built on this approach and developed a very effective cost recovery policy where the users finance up to 75 percent of the capital investment as well as the full operation and maintenance (O&M) cost. Clearly, if cost recovery was the mantra of the 1990s, the Chinese were well ahead of the curve (Littlefair, 1998).

The last decade has seen the publication of a range of literature focusing on evidence for WTP for water. The documents reveal that the poor in developing

countries are willing to pay as a result of their demand for access to potable water. Hence, public (state) and private (development) agencies are attempting to apply standardized levels of WTP with a view to generating revenue for further infrastructural development (Littlefair, 1998).

Whittington describes a study from Onitsha, Nigeria (1987) which illustrates how levels of payment for water equate to the financing of urban water supply infrastructure development. Hardin (1968) believes that governments of developing countries increasingly seek methods of cost recovery to improve public utility service provision. They do so by attempting to assess the amount consumers would contribute to the costs of such service provision. To this end, indigenous governments in developing countries have had to become more innovative in the area of finance. Briscoe (1997) suggests that attention to the rural area should be pursued as an additional source of state revenue. However, Whittington (1987) states that little is known about household behaviour in securing water for domestic purposes and how much they are willing to pay for improved services.

Major development agencies such as the World Bank promote the pricing of water as a means for public water utilities to manage the allocation of existing water supplies more effectively. It therefore supports the economic concept of willingness to pay for water. The Bank's approach to estimating levels of WTP is by application of the 5 percent rule. This rule commonly assumes that there is an elastic demand for the purchase of water with a cost of less than 5 percent of a household's income and an inelastic demand where the cost exceeds 5 percent of

the household's income. The Bank's support for rural water projects in Ghana, for instance, was aimed at the "provision of reasonable access to safe water to all communities that are willing to contribute towards the capital cost and to pay for all operation and maintenance costs of an improved supply" (Kendie, 1994). As a result, tariffs were introduced several years ago in some countries as a solution. However, in many of these cases, no income analyses were conducted and tariff levels were normally largely influenced by political considerations (Kendie, 1994). The tariffs do not reflect the ability and willingness to pay concepts and may be regressive from the point of view of impacts on the poor (Songsore, 1992).

There is always a major welfare issue at stake when it comes to determining tariff levels. Politicians assume that rural people are poor and a tariff high enough to recover the real cost of water would impoverish many people and drive the poor to use polluted water sources. Politicians keep tariffs at low levels without reference to actual income levels and volume of water used. Hence, insufficient revenues are collected "making expansions to meet the needs of the growing populations agonisingly slow" (Kendie 1994).

Rogerson and Rogerson (1996) states that development agencies tend to overestimate the amount individuals are WTP whilst government agencies tend to underestimate it. Consequently, Rogerson and Rogerson (1996) advocates further research, but at the household level in order to assess levels of WTP more accurately. He continues to argue that inaccurate pricing levels for water often result in the failure of many water supply projects. USAID (1996) is aware that

the situation is compounded by project failure as it is misinterpreted by water planners and public officials as an indication that the price is set too high rather than an indication of unmet demand and dissatisfaction. This situation confirms Altaf and Hughes (1994) assertion that there is a social distance between planners and beneficiaries leading to a high chance of misjudging consumer demands.

Thus, there are rather few studies in the literature to provide guidance on the conduct of ability and willingness to pay surveys to determine actual tariff levels for rural water use. Studies on WTP and Ability to Pay (ATP) have largely been conducted for urban centres (Kendie, 1994). McPhail (1993) examines the WTP in relation to the “Five-percent Rule” introduced by the World Bank and adopted by the Water Agency in Morocco. McPhail concludes that in general, households in Rabat could afford more than the 5 percent of household income assumed by the agency. Similar findings were reported for Port-au-Prince in Haiti by Fass (1988), Addis Ababa in Ethiopia by Linn (1983), and Onitsha in Nigeria by Whittington et al. (1991).

While these studies reveal variations in WTP according to income, educational attainment and the gender of the individual in these settings, they nevertheless have limited utility in rural studies in view of the disproportionately higher poverty and illiteracy in rural communities. These will influence the WTP (Kendie, 1994). In the Onitsha and Ukunda case studies for example, direct purchase of water from tankers and kiosks were reported. These already existing arrangements will positively influence the WTP for public water service. In many rural areas, direct water purchase of this type is non-existent. Furthermore, the

availability of water in traditional sources such as streams in the rural areas, but which may not be readily available in urban areas, may make a direct application of urban studies to rural environment difficult (Kendie, 1994).

Managing the maintenance of rural water supply in Ghana

Managing the maintenance of rural water supply facilities in Ghana has been a major problem in the water sector. This is attributed to the fact that both government and donor agencies (including NGOs) have since the 1970s concentrated mainly on the installation of water supply facilities in rural areas without considering how to ensure the sustainability of the facilities. These projects are normally characterized by poor management strategies which lead to the breakdown of the facility a few years after its commissioning.

Kendie (1992) opines that managing a rural water supply project successfully means operating and maintaining the water systems on a day-to-day basis so that they continue to supply water as planned. A survey in Northern Ghana by Davis and Garvey (1993) reveals that to ensure effective community management, there is the need for a clear understanding of community ownership and responsibilities. This is because the communities may feel the water supply facilities are owned by the donor agency and not the community members. This results in community's lack of care and confidence to deal with even minor operational problems. Further, where the community management bodies exist, they may not function effectively because: each committee may see the water supply facility as belonging to government; the role of a water committee is not

also clearly defined; members of the water committee are also members of political committees; management bodies are not given adequate training; water committees have no real authority to act within the community; where the traditional structures exist, women who have interest in the management of water supply are excluded; and finally, communities are not allowed adequate time for consultation on programme planning before the community-agency agreement is signed (Davis & Garvey, 1993).

It was in response to the lack of sense of ownership of water supply facilities in rural areas that the National Community Water and Sanitation Project (NCWSP) was established in 1994 by an act of government to oversee the implementation and management of these facilities. Under the NCWSP a number of strategies and approaches were adopted to ensure effective management of water supply facilities. These strategies include community management of facilities, the adoption of demand driven approach and the use of decentralised structures.

Community management

The National Community Water and Sanitation Project Policy defines Community-Management as where one or more communities or sections are directly responsible for the planning, operation and maintenance of their facilities and or a collection of revenues to meet recurrent and replacement costs. Communities may choose to contract operations, maintenance, repairs and/or revenue collection functions to a private company. Two types of communities are

used in the workings of the NCWSP. The first is rural communities where the minimum population should be 75 persons and the second group of communities which are normally referred to as small towns describe a wide range of towns or a cluster of villages with the following characteristics:

- Population of between 2000 and 50000
- have pipe born network as their main source of water supply by themselves or by delegating the responsibility to another body (eg. private firms)
- Sets its own tariffs and other operational policies in close consultation with District Assembly (DA).

It was envisaged that community management will improve service by allowing communities to be directly responsible for the management of their water and sanitation facilities.

Demand driven approach

For the effective management of the programme, a demand driven approach has been adopted under which communities initiate their demand for facilities of their choice. This demand should be backed by the communities' ability to pay for their part of the total cost of providing the chosen facility. The approach also recommends that communities should be responsible for the maintenance of these facilities once provided. To support this strategy/approach a range of technical options are made available to communities to enable them make informed decisions after considering the various alternatives available.

This approach has a number of advantages. Firstly it commits the communities to the ownership and management of these facilities and thereby helps to ensure the sustainability of facilities provided. Secondly, the demand driven approach ensures that limited government funds are channelled to communities that will maintain their water and sanitation systems. With the exception of these two basic strategies mentioned above some key elements of the strategies adopted under the NCWSP are summarized as follows:

- CWSA to play a facilitating role in ensuring equity and widespread coverage of water and sanitation facilities through targeted subsidies supporting basic service level;
- District Assemblies to play a central role in supporting community management;
- Private sector provision of goods and services;
- Special focus on women as the principal users of water, planners, operators and managers of community-level water systems;
- Integrated approach to hygiene promotion, water and sanitation.

NCWSP and the decentralization policy

The structure of the rural water sector in Ghana had been transformed over the years. The role of central government had reduced and changed from controlling the planning, construction and maintenance to facilitating others to carry out these responsibilities. The private sector, District Assemblies and communities had emerged as important players with primary responsibility for

planning and implementation, including the provision of limited co-financing for construction and full financing for maintenance. The NCWSP was also fashioned to work within the framework of the national decentralization policy embarked upon since 1988 and backed by the Local Government Law 1988, PNDC Law 207 and now some provisions of the 1992 constitution (CWSA, 2003). Thus the Programme seeks to transfer authority, responsibility and capacity from the central government to the District Assemblies (DAs). The policy is also designed with the aim of promoting participation in the management of water supply facilities at the grass root level.

Water facilities

A community selects the type of water supply facility from a number of available options. The service options available under the programme are the pipe system, the hand dug well and boreholes fitted with hand-pumps. The demand for a particular water facility is linked with the population of the community making the demand. The following shows the population range and the water supply facility provided.

<u>Population Range</u>	<u>Facility</u>
75-300	Hand Dug Well (HDW)
301-500	Borehole (BH)
501 – 50,000	Pipe System

Yanore (1995) observes that the Bolgatanga Community Water Supply and Sanitation Pilot Project was designed to find out whether communities were

willing and able to take responsibility for managing their water supply and sanitation systems. The project's objective was therefore to develop a strategy for transferring maintenance responsibilities to the communities with fund mobilization, savings and spare parts distribution as important elements. The other objective was to emphasize the involvement of women in playing lead roles in the community management concept.

The main task of the project was to transfer management responsibilities of maintenance to the community. It was therefore imperative to develop strategies that will enhance capacity building in knowledge, skills and problem resolution methods at the community level. The primary focus was the pump community using a combination of recognized traditional, political and social organizations as entry points. It was necessary for each community to establish a seven member Water and Sanitation (WATSAN) Committee. The WATSAN committee had the responsibility for the day-to-day running of the water or sanitation facility. Women being the traditional providers of water in the project area took lead roles on the committees. The committees were provided back-up support by Village Extension Workers (VEWs) who were paid a small allowance by the project. Each VEW supported an average of 15 communities. The VEWs were nominated by the communities and acted as liaison between the project, the committee and the community.

Community participation is the pivot upon which the success of any community activity hinges. The communities were therefore initially assisted to organize themselves to participate actively in planning how to take control of the

operation of the water points. The task of communities organizing themselves to deliberate regularly on issues of management became a tradition through the efforts of the village extension workers. The WATSAN committees utilized the traditional leadership of the village chiefs and elders in resolving problems encountered amongst themselves and other community members. A feeling of sense of belongingness and ownership positively developed amongst the people and helped towards the achievement of positive results (Kwashie, 2007).

Financial management deficiency is one of the main obstacles to the smooth functioning of decentralized water systems. Thus funds mobilization and sound financial management methods were of great importance. Because of self management of funds and improved book keeping skills introduced by the project, all communities collected sufficient monies for maintenance during the three year period of the project. However, one case of financial mismanagement was reported and a few more individuals defaulted payment of pump maintenance funds. In some cases the recalcitrant individuals were prevented from having access to the water facility (Kwashie, 2007).

Conceptual framework

The conceptual framework for the study was the problem tree analysis (PTA). This technique was adopted to examine the causes and effects of poor management of rural water supply facilities effectively in the Builsa district.

Problem tree analysis (PTA)

The problem tree analysis shows a complete hierarchy of causes and effect or consequences of the core problem at stake in the form of a tree. The logic is that every problem has a root cause and an effect on the affected community. The causes of the core problem are the roots of the 'tree', while the effects are the 'branches', and the trunk being the core problem.

The core problem of the study is the ineffective management of the maintenance of rural water supply facilities. The immediate causes of this problem are: social, economic, political, institutional, and technical factors. These problems occur as a result of poor design, inadequate funding, low or non involvement of beneficiary communities, unfavourable government policies, unavailability of spare parts, low motivation of staff, conflicts within the traditional setup, and political interference.

The immediate effects of ineffective management would include: low output performance, high facility breakdown rate, high patronage of traditional unwholesome sources of water, poor health, low productivity, low income, and hence poverty. Figure 1 illustrates the causes and effects of ineffective management of the maintenance of rural water supply facilities.

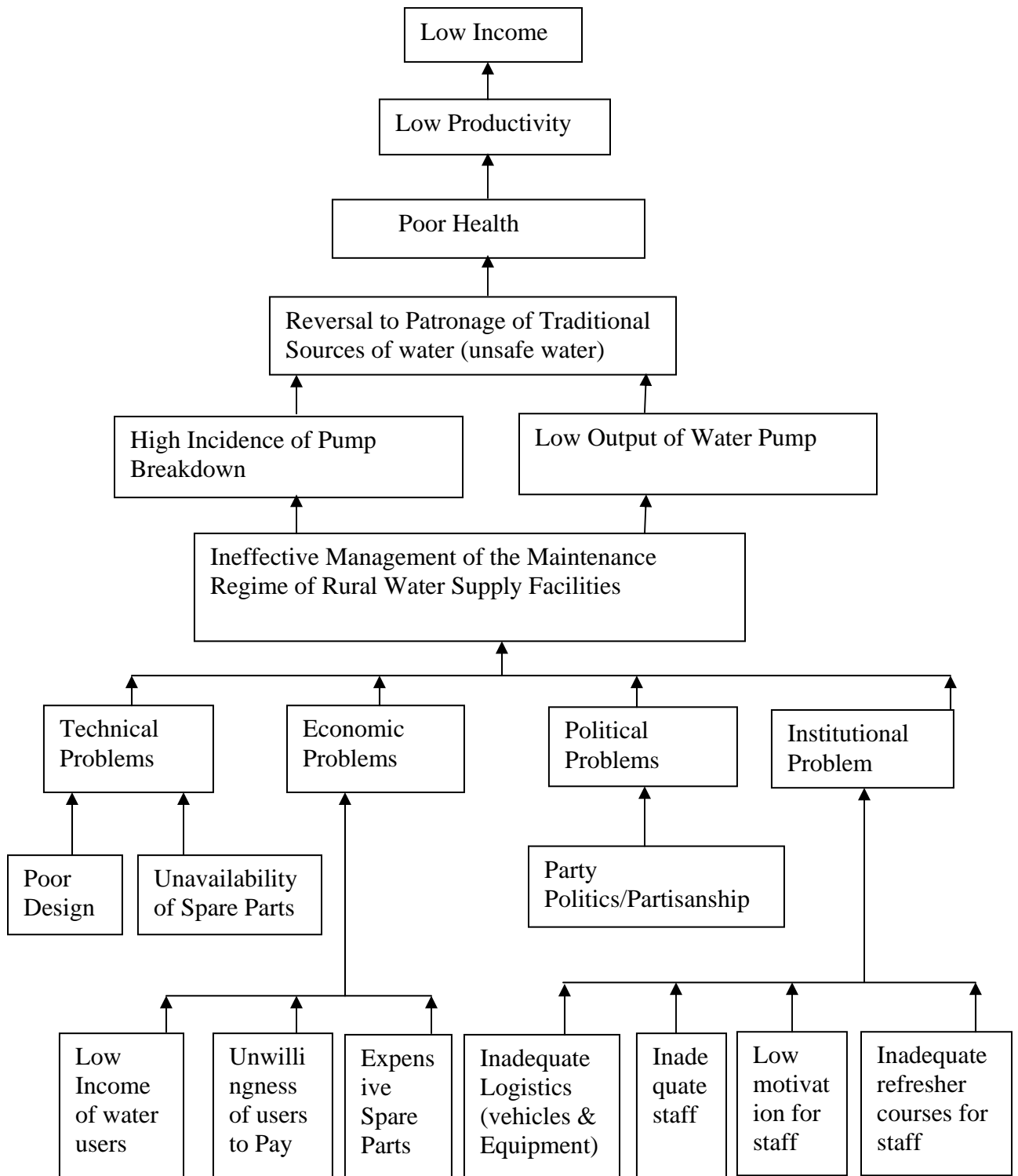


Figure 1: Problem tree analysis for managing the maintenance of rural water supply facilities

Source: Essaw (2001)

The core problem is the Ineffectiveness in the Management of the Maintenance of Rural Water Supply Facilities in the Builsa District. Technically, there were two major hindrances to the effective management of the maintenance of water supply facilities in the district. These were poor technological designs and the unavailability of hand-pump spare parts for servicing and repairs of the water supply facilities. Poor designs have contributed significantly to the frequent breakdown of the water supply facilities because of poor quality of the facilities and the lack of sufficient knowledge in the appropriate usage of the facility.

There was also the problem of unavailability or scarcity of hand-pump spare parts in the event of a breakdown. For instance, it was revealed that the area mechanics and WATSAN committee members in the district on several occasions were forced to travel to Bolgatanga, Tamale, Kumasi or Accra to purchase spare parts. This had a negative impact on managing the maintenance of the water supply facilities in the district.

Economically, the maintenance of water supply facilities in the district had been very frustrating due to low incomes, and a high poverty rate amongst residents. This has resulted in water user unwillingness to financial contributions either towards maintenance or repairs of the water supply facilities.

Politically, most of the staff of the DWMT and the District Assembly in charge of rural water supply facility maintenance was seriously divided on the basis of political party affiliation. This affected their ability to work as a team in the various communities. Hence community visitations to carry out sensitisations

programmes on the proper usage of the water facilities and the need to maintain them were at a standstill.

Finally, the DWMT which formed the backbone of the maintenance process in the various communities had over the years been handicapped by inadequate logistics, low motivation, inadequate refresher training, and weak staff strength. These deficiencies were identified as hindrances to managing the maintenance of the water supply facilities in the district.

Thus, the technical, economic, political, and institutional problems in the Builsa district must be resolved in order to achieve effectiveness in managing the maintenance of rural water supply facilities in the district.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter describes the study area, the research design, population, sampling of the study population, and the various data collection techniques and instruments used in the study. It also covers the procedure for data collection, processing and analysis.

Study area

Located in the south-western part of the Upper East Region, the Builsa District is one of the eight (8) districts in the Upper East with Sandema as its administrative capital. It covers a total land area of 2,220 square kilometres. The district shares borders with the Kasina-Nankani district to the north-east, the Sissala district to the north-west and the West Mamprusi district to the south (Figure 1). There are 13 traditional divisions in the district, with a total of 190 hand-pump communities. These traditional divisions are spread all over the district with the nearby and farthest traditional divisions covering distances of five kilometres and 50 miles respectively from Sandema, the district capital. The 2000 population and housing census put the population of the district at 75,375. This Figure comprises 36,996 males and 38,379 females (Ghana Statistical Service, 2000).

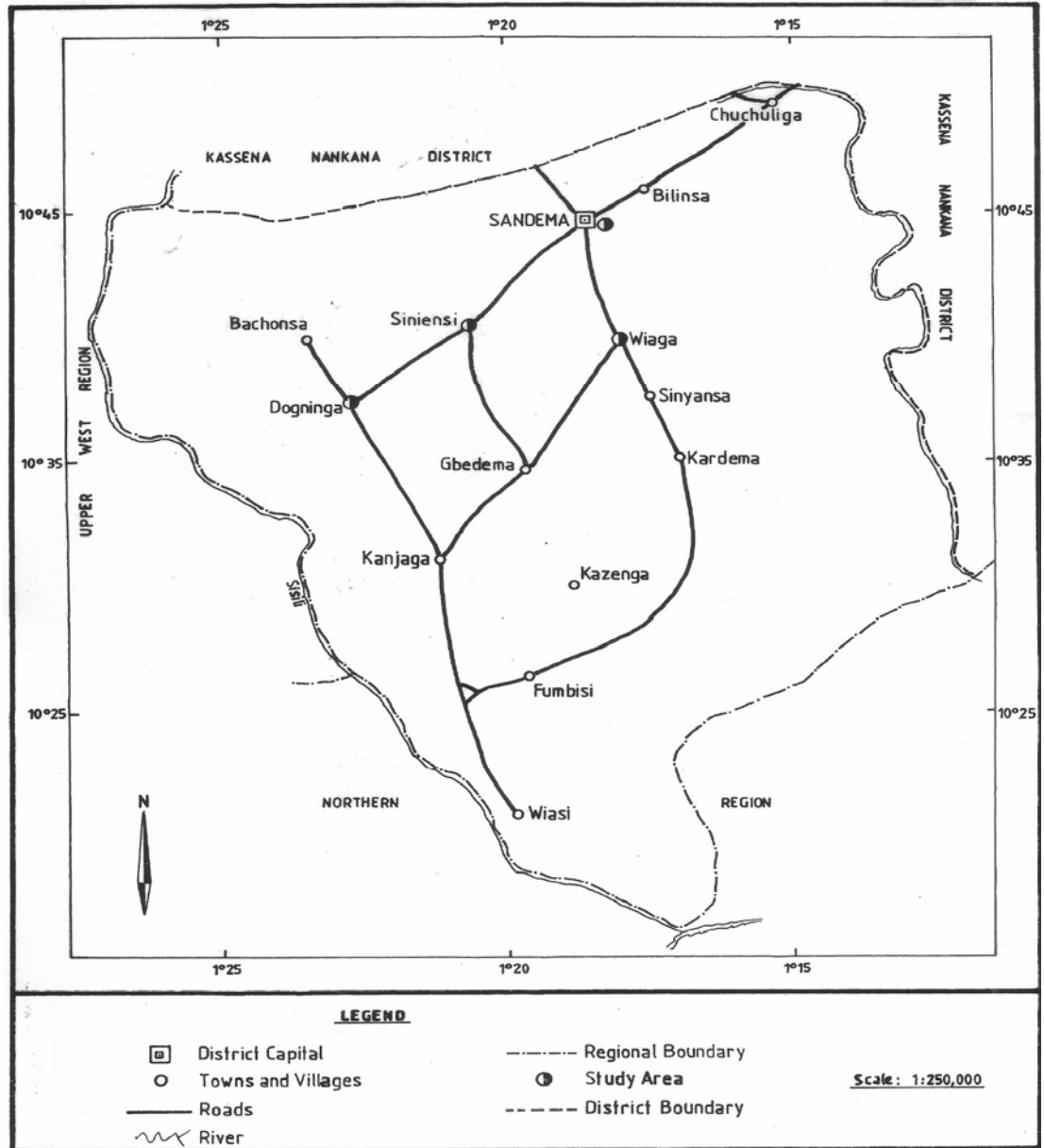


Figure 2: Map of Builsa District showing the study areas

Source: Cartography Unit, UCC, 2009

Water sources

The major sources of drinking water in the district are borehole, well fitted with hand-pump (WFHP), open well and surface water-river, stream etc.(CWIQ, 2005) . Most importantly the district has 225 boreholes, 46 wells fitted with hand-pumps and 218 open wells. Majority of these water points were constructed under the Canadian International Development Agency, Upper Region Water and Sanitation Project (CIDA-URWSP), and by other agencies such as United Nations Children’s Fund (UNCF), Japan International Cooperation Agency (JICA), European Union (EU), the Adventist Development Relief Agency (ADRA), and government agencies including the Community Water and Sanitation Project II (Builsa DWST, 2006). The following comprise the distribution of water sources in the district: public outdoor tap (1.9%), piped into compound (0.6%), boreholes (54.4%), well fitted with hand-pumps (7.9%), vendor truck (0.6%), unprotected well (24.0 %), river water (4.9%), rain water (0.8%) and 1.7 percent of the people have their water from other sources (CWIQ, 2005). With more than half of the districts population depending on boreholes (54.4%) and wells fitted with hand-pumps (7.9%) as their main source of portable water, effective management of the water supply facilities becomes very paramount in order to guarantee continuous and sustainable supply of water to the people.

About 68.0 percent of the people in the district have access to safe water sources (CWIQ, 2005). It is important to note that 54.4 percent of the districts rely on boreholes as their main water sources. This shows a huge improvement in the

usage levels of boreholes as drinking water sources compared to findings from previous studies.

Political governance

The District has one paramount chief based in Sandema and twelve divisional chiefs responsible for governing the twelve remaining traditional divisions in the district. At the community level, the paramount chief/divisional chief is represented by the 'Kanbonaab' (community leader), who is entrusted with the responsibility of governing community members. Further, the District has two electoral constituencies, that is Builsa South and Builsa North. The Builsa District Assembly is made up of 64 members, 42 of whom are elected. The Assembly also has 22-Member Executive Committee and 10 Sub-Committees through which the Executive Committee operates. The sub-committees are:

- Development Planning Sub-Committee
- Works Sub-Committee
- Justice and Security Sub-Committee
- Finance and Administration Sub-Committee
- Social Services Sub-Committee
- Public Relations and Complains Sub-Committee
- Health and Environment Sub-Committee
- Economic Development Sub-Committee
- Education and Culture Sub-Committee
- Women and Children Sub-Committee

The Town/Area Councils and Unit Committees are vital development at the local level. Hence as provided under the 1992 Constitution, the Builsa District Assembly has created three (3) Town Councils and five (5) Areas Councils and has also put in place 91 Unit Committees in all the 8 Town/Area Council Zones. The Unit Committee members act as representatives of the various communities at the assembly level. They are responsible for addressing the needs of the communities (including water supply, Sanitation, infrastructure, etc.) through the district assembly. The District Chief Executive who also chairs the Executive Committee heads the Office of the District Assembly.

Climate

The district observes two distinct climatic patterns, that is, the rainy season and the dry season. The rainy season occurs between May and September, and has a mean annual rain fall ranging from 125cm to 200cm (Benneh and Dickson, 1988). Since irrigation agriculture is limited, most farming activity takes place in this season. Relative humidity is high during the rainy season (70 to 90%). Conversely, relative humidity in the dry season (November-April) can be as low as 20 percent and the mean monthly temperature varies sometimes as high as 40 degrees Celsius in March to about 26 degrees Celsius in August (Benneh and Dickson, 1988). The dry north-easterly winds from the Sahara desert (the Harmattan) dry up the vegetation during this season. Bush fires subsequently destroy the vegetation, leaving a parched and empty terrain (Kendie, 2002). As a result of the harsh climatic conditions in the district, natural sources of water dry

up during the dry season. Prior to the provision of the water pumps (boreholes and wells fitted with hand-pumps) women walked long distances in search for water during this period.

Topography

The Builsa District has a gentle topography with slopes ranging from 200m to 300m in the northern part of the district. The southern valleys of the district have more gentle slopes ranging from 150m to 200m. Isenberg and other granite outcrops occasionally break the monotony of the near flat surface. A greater portion of the soil is made up of ground water laterite developed over the granite formations. The texture of the soil varies within the district but coarse textured soils predominate with various amounts of loosely packed stones and concretions. The alluvial soils of the south are very suitable for the rice cultivation due to the seasonal flooding in the area. The vegetation is characterised by Savannah Woodland and consists of deciduous, widely spaced fire and drought resistant trees of varying sizes and density with dispersed cover of perennial grasses and associated herbs. Overtime, the woodland savannah has been reduced to open park land with trees of economic value like shea nut, dawadawa, acacia, and baobab (www.ghanadistrict.com).

A significant portion of the District falls within the Volta Basin and is heavily dissected by the White Volta and its tributaries, such as the Sissili River, Rivers Kulpawn, Belipieni, Bulpegi and Asebelika. These rivers are seasonal in nature and thus, dry up during the long dry season and over flood their banks

during the rainy season causing widespread floods in most parts of the district. Further, the district has dammed water in all the 13 villages which serve as a source of water for dry season gardening and livestock. However, the majority of these dams dry up during the dry season mainly due to the intensive evaporation and high level of dependency on the water bodies by both human (gardening, building etc) and animals.

Occupation

The dominant occupation of the people in the Builsa district is agriculture (subsistence farming). Other occupations in the district include trading, teaching, and artisanery. Women undertake artisan work mostly in handicrafts (smock and basket weaving and pottery making) in the dry season. Pito (locally produced wine) brewing is a lucrative business for the women. Some petty trading is also carried out to supplement family income (Kendie, 2002). Manufacturing occurs only on small-scale basis in carpentry shops, textile (smock) looms and shea butter processing. The agricultural season is influenced by the seasonality of the rainfall pattern, with most of the farming activities undertaken during the rainy season, which is from May to October (Kendie, 2002). Crops grown are mainly staple (guinea-corn, millet, maize, groundnuts and beans). The District also has an abundance of goats, sheep, cattle, and fowls. The high dependence on a very uncertain and irregular rainfall pattern and declining soil fertility has usually resulted in low incomes and poverty in the district particularly in the dry seasons of the year, hence the periodic need for food aid.

Poverty and dependency

With a predominantly subsistence agricultural farming economy and very limited or in some cases non-existent lucrative economic activities in the district, poverty levels have been very high over the years. The Ghana Living Standards Survey (GLSS-2000) put the poverty line at 900,000 cedis (90 Ghana cedis) per annum and absolute poverty included all persons earning less than 700000 cedi (70 Ghana cedis) per annum (GLSS, 2000). Based on the classification by the GLSS, the Core Welfare Indicator Questionnaire (CWIQ, 2005) arrived at the conclusion that the Builsa district had 16.2 percent of its populace very poor, 56.3 percent were poor, 25.1 percent of the people were classified as neither rich nor poor, and 2.4 percent were found to be somewhat non poor.

The high poverty level in the district is further compounded by an age dependency ratio 0.9 percent. About 44.4 percent of the people are between the age bracket of zero and 14, and 5.2 percent are 65 year plus (CWIQ, 2005). This implies that, 46.6 percent of the people are economically inactive and thus, depends on the remaining 53.4 percent (economically active class) for a livelihood. Therefore in the phase of very limited jobs and an uncertain or unreliable rain fed agricultural sector in the district, the incomes generated by the working class are too meagre to cater for their dependents. This has been one of the major reasons for the high spate of poverty in the district and it also explains why households find it difficult to pay water levies or contribute meaningfully to water project operation and maintenance.

Literacy

Literacy rates generally in the three northern regions are very low compared to the rest of the country. For instance only 26.3 percent of the adult population in the Upper East Region have been to school (GLSS, 2000). The situation has been no different in the Builsa District. The district has 16.9 percent of its adult population reported as literate (CWIQ, 2005). Statistics from the CWIQ (2005) indicate that 18.7 percent and 15.4 percent of adult males and females respectively have been to school in the District. These figures are rather very low compared to other districts in the country. The District has two technical or vocational institutions and three secondary schools and a number of newly constructed primary schools to help improve the literacy rate in the district.

Housing and sanitation

Except in the Sandema township, virtually the whole of the districts' population lives in rural settlements where houses are built largely from mud with thatch or mud roofs, occasionally with corrugated iron sheets (Kendie, 2002). "Ventilation is mostly inadequate and some rooms with mud roofs just have a chimney for ventilation. While this design ensures adequate warmth during the cold, dry season, it is also partly responsible for the annual outbreak of cerebral spinal meningitis (CSM) disease" (Kendie, 2002. pp. 44-45).

With regards to sanitation, the most visible evidence of good sanitation is the presence of a clean toilet facility for the disposal of human wastes. Majority of hand-pump communities in the district have no household toilet or even a public

toilet for use. Adults defecate in the bushes behind their homes and children defecate sometimes in the compound or just by the walls of the buildings (Kendie, 2002). It is estimated that only 4.0 percent of the people in the district practice safe sanitation (CWIQ, 2005). That is, 96 percent of the people do not have toilet facilities and hence defecate in the bush, also 3.5 percent use ventilated improved pits (VIP), and the remaining 0.5 percent use covered pit latrines (CWIQ, 2005).

Research design

The study is a non-interventional study and adopted the descriptive research design. Since much is known about the existence of the problem in the region, based on results from previous studies, the descriptive design is the most appropriate design to adopt. The descriptive design is employed to facilitate the systematic collection and presentation of data that give a clear picture of the current situation and the causes of the poor management of the maintenance of rural water supply facilities in the District.

Study population

The population of a study is defined by Jaeger (1988) as “the group of persons, objects or institutions that defines the objects of the investigation”. The target population comprised the following:

- All traditional divisions in the district with bore holes, wells fitted with hand-pumps, open wells and surface water as their main sources of water

- All WATSAN Committee members
- All pump repair mechanics
- Pump spare parts dealers
- Community opinion leaders
- Hand-pump community women representatives
- Officials of the Community Water and Sanitation Agency (CWSA)
- District Water and Sanitation Team (DWST)

Sample size and sampling procedure

The question about the right sample size in research is one that is of great concern to the social investigator. In simple terms, it refers to basic questions such as; how large or small must the sample be for it to be representative (Sarantakos, 1998).

According to Fowler (1993), the size of a sample is one of the most common questions posed to research methodologists. To Fowler, one proverbial misconception people have is that “the adequacy of a sample size depends heavily on the fraction of the population included in that sample”. For instance, those who hold such a view would say one percent or five percent or some other percentage of a population will make a sample credible. In spite of this argument, Fowler (1993) asserts that the vast majority of survey samples involve small fraction of populations. In such instances, he contends that small increments in the fraction of the population included in a sample will have no effect on the ability of the researcher to generalize from a sample to a population.

Further, in the view of Fink and Kosecoff (1990), the size of a population from which the sample of a particular size is taken has virtually no impact on how well a sample is likely to describe a population. For instance, Henry (1999) and Fowler (1993), reports that a sample of, say, 150 people will describe a population of 15000 or 15 million with virtually the same degree of accuracy, assuming that all other aspects of the sample design and sampling procedures were the same. Compared to the total sample size and other design features like clustering, Fowler (1988), agreed that “the impact of the fraction of a population sampled on sampling errors is typically trivial”.

In view of Fowler, the first requirement for determining a sample size is an ‘analysis plan’. The main component of this analysis plan is not an estimation of confidence intervals for the overall sample but rather an outline of subgroups within the total population for which separate estimates may be made. The main issue is, most sample size decisions do not focus on estimates for the total population; rather, they are concentrated on the minimum sample sizes that can be tolerated for the smallest subgroups of importance (Tuffour, 1996).

From the preceding discussion, one can say there is no definite or fixed answer about how large a sample should be to any given study. Consequently, considering the homogeneous nature of the people in terms of facility management practices, governance and culture as well as the wide distances between traditional divisions in the district, the sample estimation arrived at a size of 200 respondents. As outlined in the target population, the key subgroups for the study comprised the District Water and Sanitation Team (DWST), area pump

mechanics, spare parts dealers, WATSAN committees (care takers), opinion leaders, and women representatives. The distribution of respondents is shown in Table 2.

Table 2: Distribution of respondents by category/group

Respondent/Category	Total Population	Total to be Interviewed
Community leaders	10	10
Assembly men or women	10	10
WATSAN Committee members	70	20
Women representative	10	10
Water users	4260	138
Staff of the District Water and Sanitation Team	7	7
District area mechanics	4	4
Spare parts dealer	1	1
Total	4372	200

Source: Field Data, 2008

All seven officers of the District Water and Sanitation Team (DWST) were selected for the study. The four district area mechanics responsible for major repairs of pumps and the spare parts dealer in the district were also selected sampled.

The Builsa District has one paramount chief in Sandema the district capital, with a total of 12 other traditional divisions governed by divisional chiefs.

These traditional divisions' together have 190 hand-pump communities. A hand-pump community is a community in which a hand-pump (borehole or well fitted with hand-pump) is provided to a group of people numbering from 300-500 (CIDA, 1987). Therefore, the ratio of residents per hand-pump is 300-500 people to one hand-pump. However, over the years some hand-pump communities have been provided with more than one hand-pump due to the scattered nature of houses and the long distances that have to be covered before having access to the water supply facilities in the hand-pump communities. Members, through hand-pump committees, are responsible for reporting faults, keeping the pump site clean and paying the tariffs. However, due to the vast distances between houses in the Builsa district, it is very common to come across a hand-pump community with more than one water supply facility (hand-pump). Table 3 shows the distribution of the 13 traditional divisions and the number of hand-pump communities in each division together with their respective population figures and the number of boreholes and wells fitted with hand-pumps in each division.

The study concentrated on a sample of five (5) percent (that is approximately 10 hand-pump communities) of the total number of hand-pump communities (that is 190) in the district because of the homogeneous nature of the people in terms of facility management practices, governance, and culture. The simple random sampling technique was adopted to select five traditional divisions in the district. This technique offered each division an equal chance of being selected.

Table 3: Distribution of communities and their water supply facilities

Traditional Divisions	Population	Number of Hand-pump Communities	Number of Boreholes	Number of wells with hand pumps
Bachonsa	2,573	5	7	2
Chuchuliga	8,854	26	28	3
Dogninga	2,494	8	10	1
Fumbisi	8,154	25	28	2
Gbedema	3,709	8	10	-
Gbedembilisa	1,110	2	3	2
Kadema	3,410	16	19	1
Kanjarga	5,601	14	16	1
Sandema	17,549	38	51	15
Siniensa	5,741	14	16	12
Uwasi	2,524	5	9	1
Weisa	1,552	5	7	2
Wiaga	12,104	24	31	14
Total	75,375	190	225	56

Source: GSS (2000) and Builsa DWST, (2006)

The five divisions served as the sample frame out of which the 10 hand-pump communities were sampled. From each of the 5 traditional divisions selected, a list of hand-pump communities was compiled and two hand-pump communities were randomly selected from each traditional division irrespective of the size and population of the traditional division. Thus the total number of hand-pump communities selected was 10. The water users (138 in all) were selected based on the proportion of the population of each hand-pump community to the total population of the 10 hand-pump communities selected (that is, the population of a hand-pump community, divided by the total population of the 10

hand-pump communities, and multiplied by 138). By this technique the number of water users sampled per hand-pump community was determined.

Table 4 shows details of the traditional divisions selected together with their respective hand-pump communities and water sources. The population figures of the selected hand-pump communities is based on the 2000 population and housing census.

Table 4: Distribution of sampled villages and hand-pump communities

Traditional Divisions	Hand-pump communities Selected	Water Sources		Population of selected hand-pump community	Number of Water Users Selected
		Number of Boreholes	Number of Hand-dug wells		
Chuchuliga	1. Azugyeri	2	0	543	18
	2. Tiendema	2	1	472	15
Dogninga	1. Dilogsa	2	0	339	11
	2. Wupiensa	2	0	427	14
Sandema	1. Longsa	2	2	302	14
	2. Suwarinsa	2	2	432	10
Siniensi	Daasa				
	1. Akpiayeri-Guuta	2	0	573	18
Wiaga	2. Zundema	3	1	430	14
	1. Farinsa	2	2	384	12
	2. Guuta	1	0	358	12
Total	10	18	8	4260	138

Source: Field Data, 2008

Finally, the purposive sampling technique was adopted to select from each hand-pump community the following subgroups for the study: community opinion leader (Kanbonaab), assembly members or unit committee members, WATSAN committee members, and, women representatives. The purposive non-random sampling technique was deemed the appropriate means of getting respondents who are knowledgeable and well abreast with the subject matter of interest (Sarantakos, 1998). Table 5 shows the distribution of the various subgroups.

Table 5: Distribution of subgroups

Sub-Groups	Number of People in Sub-Group	Number Sampled
Community Leaders	10	10
Assembly Members	10	10
WATSAN Committees	140	10
Women Representatives	10	10
Total	170	40

Source: Field Data, 2008

In all, a total of 200 (from table 2) respondents were selected for the study; seven DWST field officers, four area mechanics, one spare parts dealer, 10 community leaders, 10 assembly men or unit committee members, 20 WATSAN committee members, 10 women representatives, and, 138 water users.

Data sources and instruments of data collection

Data for the study were collected within a two week period, which is from 27th December 2007 to 8th January 2009. Data were collected from both primary and secondary sources. The administration of questionnaires, in-depth interviews, observations and focus group discussions (FGDs) formed the basis of primary data collection for the study. The secondary source constituted text books, published and unpublished articles in the dailies, magazines, journals, library and internet search, government publications, official documents from the district assembly, the regional CWSA, the DWST and other related literature. Hence, data were collected through the following instruments; questionnaire administration, in-depth interviews, observation and FGDs.

Questionnaire administration

One set of questionnaire was administered to staff of the District Water and Sanitation Team (Appendix A). This set of questions looked at the institutional capacity of the DWST (in terms of personnel and logistics) and the problems they encounter on the field. It is important to note that the questionnaires were answered (in written form) by the staff since all could read and write. Besides, this offered them the opportunity to refer to their documents in order to give accurate responses.

Structured interview

The selected hand-pump community leaders, assembly men or unit committee members, women representatives, WATSAN committee members or facility care takers, and water users were interviewed to document their informed opinion on the efficiency of existing modes of water facility management, contribution to facility management, willingness to pay for facility maintenance, problems they encounter in the management of water facility, as well as suggestions as to how to best manage the water facility to ensure sustainable water supply in their communities. An interview guide (Appendixes B, C, D, E, F & G) was prepared to cover these issues and others that are deemed important in providing answers to the research questions and for that matter help achieve the objectives of the study.

Observation

A number of trips were made with the field officers of the DWST in order to observe how they carry out their daily duties in the hand-pump communities. The researcher also went on field trips to Seven (7) communities to observe the physical state of water supply facilities in terms of how facilities are used, the hygienic practice of facility users in relation to the surroundings of water facility. This provided firsthand knowledge on the status of the water supply facilities at the various communities. To achieve this, an observation guide was prepared which contained a list of items to be observed in the field.

Focus group discussion (FGD)

Focus group discussions were organised on separate occasions for elders of the various traditional divisions to solicit their opinion on current water supply facility management and its efficiency. The discussion focused mainly on pump community contribution to the construction, and maintenance of water supply facility. Furthermore, the discussion also included how they collectively work to ensure the sustainability of water facilities and the problems they encounter in their quest to ensure effective management. Finally, the discussion critically assessed suggestions as to how to best manage their water supply facility, and the sort of or level of external support they need or expect from the District Assembly to aid in the sustainability of water supply in their communities. In order to achieve a more informed result from the FGD, a discussion guide, covering the various areas of concern was prepared to help give the discussion a sense of direction.

Data analysis and presentation

Data collected from the field were analysed by way of frequencies, percentages and cross tabulation. The Statistical Product for Service Solutions (that is version 8.0) was employed to run frequencies and percentages of the various responses from the field. Data were presented in a tabular form depicting the frequencies and percentages. This facilitated an effective interpretation of the results or findings of the study.

CHAPTER FOUR

EVOLUTION OF WATER SUPPLY IN GHANA

Introduction

This chapter looks at the evolution of water supply in the Ghana from the late 1920s until major reforms were instituted which gave birth to the National Community Water and Sanitation Project (NCWSP). The chapter covers the Community Water and Sanitation Projects I and II (CWSP-I and II).

Background

In 1928 the first public pipe-borne water system in the then Gold Coast was developed in Cape Coast. This project was a pilot project which was managed by the Hydraulic Division of Public Works Department. With the increase in responsibility in the rural water sector, a separate Rural Water Development Department (RWDD) was formed in 1948 to take responsibility for water supply in rural areas.

After independence in 1957 a Water Supply Division was set up under the Ministry of Works and Housing with responsibilities for both urban and rural water supplies. Two years later in 1959, the country experienced severe water shortages which culminated in the development of a World Health Organisation

(WHO) sponsored 20-year master plan for the water and sanitation sector (Boaham, 2005).

As part of the WHO recommendations, the Ghana Water and Sewerage Corporation (GWSC) was set up in 1965 by an Act of Parliament, Act 310 to “provide and manage potable water supply and sewerage for domestic and industrial purposes throughout the country”. Thus the GWSC was to cater for urban as well as rural populations. The corporation was obliged to construct and operate water supply and sewerage systems and collect rates and charges for water and sewerage services. In addition, the GWSC had authority to

- Establish, operate and control sewerage systems in Ghana
- Make long-term plans for the provision of water and the operation of sewerage systems in Ghana
- Conduct research on water and sewerage issues
- Make engineering and survey plans and construct and operate water and sewerage works
- Set the standards for the water supply and the operation of sewerage systems
- Serve a notice on the owner or tenant on land in a connection area to apply for the installation of a water or sewerage system (Boaham, 2005).

With this arrangement, the rural water sector of Ghana was no different from what pertained in many other African countries (World Bank, 2002). The government of Ghana (through the GWSC) and external partners were the main

agencies responsible for the planning, construction and maintenance of rural water supplies. The private sector played a minimal role and only the foreign consulting firms put in charge of the running of these projects and the foreign drilling contractors had an input.

The efforts of the GWSC were more concentrated in the provision of urban water. Most of its staff and resources were devoted to urban water with only three senior staff at the GWSC headquarters overseeing decision making on rural water supply (World Bank, 2002). Foreign companies brought in by external funding agencies did most of the drilling works. In fact, before the 1990s, only one Ghanaian drilling company existed. Clearly, this situation created an atmosphere where competition was absent and resulted in very high cost of drilling. For instance, it is claimed that in 1990 a borehole drilled in Ghana cost 33 percent higher than the cost of drilling a similar borehole in the UK or USA (Batir, 2007).

By the early 1990s it had become increasingly difficult for the GWSC to maintain the over 8,600 rural water points, the majority of which were boreholes fitted with hand-pumps and about 80 small town piped systems (World Bank, 2002). Thus, at any particular time it was not strange to find that many of these facilities were broken down due to two main reasons: it was difficult for maintenance teams of GWSC to frequently visit pump sites and limited the number of technicians available to deal with the many pumps sites. The GWSC also collected little revenue from rural users enough to cover 10 percent of hand-

pump maintenance cost and 20 percent of the operation and maintenance cost for the rural piped systems (Batir, 2007).

There was little or no involvement of communities in the planning, construction, and maintenance of water supply facilities; hence there was no sense of ownership of the water supply facilities by the beneficiary communities. It therefore became necessary to transform and restructure the water sector in Ghana. The restructuring process which took place within the last two decades was aimed at improving access to water and sanitation facilities. The driving force for the restructuring was the Economic Recovery Programme implemented between the period 1983-1993 and the idea of decentralization of public administration initiated in 1988 (Boaham, 2005).

The process of restructuring and transformation began with series of studies in the water sector and workshops organised by the then government of Ghana (Government of the National Democratic Congress) to debate the study's findings (in 1992 and first half of 1993). Based on the recommendations of a National Rural Water and Sanitation Conference held at Kokrobite, Accra in May 1991, a Community Water and Sanitation Division (CWSD) was established within the then Ghana Water and Sewerage Corporation in March 1994 (CWSA, 2003). The establishment of the Division followed the signing of an agreement between the government of Ghana (GoG) and the International Development Agency (IDA) of the World Bank which represented the interests of external development partners.

The CWSD became a semi-autonomous entity known as the Community Water and Sanitation Agency (CWSA) after a bill was approved by Parliament in October 1998 and president assent given on 30th December 1998. The CWSA was set up to facilitate the process of implementing a National Community Water and Sanitation Programme (NCWSP) which was launched in 1994. By the coming into being of the NCWSP there was a de-linking of urban and rural water supply in Ghana. Urban water became the responsibility of the Ghana Water Company Limited (GWCL) which from 1 July 1999 had become a public limited liability company. District Assemblies were to take charge of urban sewerage. Rural water and sanitation issues were transferred from the GWSC in 1994 to the CWSA.

Objectives of the NCWSP

The overall goal of the NCWSP was to increase water and sanitation facilities in the rural areas and small towns of Ghana. The specific objectives are to:

- provide basic water supply and sanitation to communities that will contribute towards the capital cost and pay the normal operations, maintenance and repair cost of their facilities,
- ensure sustainability of these facilities through community ownership and management, community decision-making in their design, active involvement of women at all stages in the programme, private sector involvement in the provision of goods and services and the public sector promotion and support; and

- maximise health benefits by integrating water, sanitation and hygiene education intervention, including the establishment of hygiene education and latrine construction capabilities at the village level.

Actual implementation of the NCWSP has been in two phases. The first phase (CWSP1) was implemented from 1994 to 2000. The second phase began in 2000 and was meant to build upon the achievements of CWSP1 by supporting district water and sanitation in the broader concept of the on-going decentralization reforms and other rural development initiatives in the country (Operational Manual CWSP2, 2000).

Community Water and Sanitation Project I (CWSP-1)

The Ghana Community Water and Sanitation Project I (CWSP-1) was a long-term investment program funded by International Development Agency (IDA). It was initiated in 1994 to support the National Community Water and Sanitation Project (NCWSP) and Action Plan, which is the product of a national policy reform project to improve the quality of water supply and sanitation in rural areas and small towns. The CWSP-1 was intended to complement the existing activities of the central government water authority, which now focuses on building larger systems. The rationale for this project was to build capacity and institutions for district water and sanitation programs within the context of decentralization reforms in the country. Initial project objectives were to provide capacity to meet community demand for water and sanitation in 500 rural

communities and 30 small towns on a sustainable basis through a combination of government, private sector, and community decision making and management.

The CWSP-1 designers selected a community-based approach as a complement to decentralization reforms and as a preferable alternative to the existing central government agency-led approach, which had proved to be ineffective in developing sustainable rural water. In brief, the project supports the creation of a professionally managed Water Supply and Sanitation (WSS) agency, and a Community Water and Sanitation Division (CWSD), which is independent of the existing national government WSS agency. The CWSD supports regional and local Water Supply and Sanitation (WSS) units. The regional WSS teams (regional water and sanitation teams-RWSTs, which are regional bodies of the CWSD) train and help manage the procurement process as District Water and Sanitation Teams (DWSTs) develop. The DWSTs are part of the District Assembly but independent of the CWSD and the existing national WSS agency. Finally, the CWSP-1 supports the development of community WSS committees (WATSANs and Water User Groups-WUGs). In addition to supporting government capacity building, the CWSP-2 supports developing private sector capacity for designing, constructing, and maintaining rural WSS systems; developing NGO capacity to facilitate community mobilization and develop private and public sector capacity; and developing the capacity of households and communities to articulate demand for WSS and to operate and maintain these systems (Operational Manual CWSP-2, 2000).

Initially, start-up finance for water supplies under the CWSP-1 was disbursed mainly to regional offices of the CWSD. Some start-up finance was also channelled through the central government WSS agency, which has well-developed relationships with bore-hole well contractors and NGOs. The RWST contracts with NGOs to provide assistance with both capacity development and community mobilization.

Community mobilization and capacity building was structured in a way that the CWSD works with local government to create District Water and Sanitation Teams (DWST), which are technical units at the local government level that support community-based water organizations. District Water and Sanitation Teams (DWST) work in partnership with the RWST and a national NGO to recruit local NGOs to facilitate community mobilization and assist with capacity building in the public, civil society, and private sectors. Formally, NGOs are contracted by the RWST, but they work in close partnership with the DWSTs (Operational Manual CWSP2, 2000).

The construction of water and sanitation facilities is initiated as follows. The district representative, who is a member of local government, meets with the community and informs the people about the availability of funding for constructing a community water supply facility. If a community indicates interest and willingness to comply with the programme requirements, the district representative assists them in making an application for funding and submitting it to the District Assembly for review and approval. The programme required that communities contribute 5 percent of the cost of water supply facilities in cash up-

front and assume 100 percent of the cost of operation and maintenance. The remaining 95 percent of the cost are financed by a grant from the donor and channelled through the CWSD (Operational Manual CWSP2, 2000).

It is important to state that the Ghana CWSP relies on simple technologies to provide inexpensive access to clean water supplies and sanitation. The RWST manages project design and implementation, in consultation with other stakeholders. With assistance from DWSTs and NGOs, community water groups decide on the combination of open access dug-wells and bore-hole wells with hand-pumps that best fit their circumstances.

This CWSP-1 was designed within the context of decentralization reforms in Ghana. These reforms have affected every sector of society. As the project has been implemented and scaled-up, additional policy and institutional reforms have been undertaken, mainly with respect to further decentralizing political, administrative and fiscal authority and removing bottlenecks in project development and maintenance processes (Operational Manual CWSP2, 2000).

Several aspects of the project design provide incentives for performance. The requirement that households and communities contribute toward capital costs as well as assume responsibility for operation and maintenance creates incentives for sustainability. Technology specifications provide the opportunity to develop simple, low-cost water and sanitation systems. The availability of long-term funding for developing community water and sanitation creates the opportunity to develop internal capacity to provide technical, construction, and social intermediation services to households, communities, and all levels of government.

Project specification to use NGOs in the project development process makes it possible for professionals to organize and provide services on a non-profit, tax exempt basis.

A participatory evaluation indicated that communities were joining the project through their own initiative, collecting their required contribution to capital costs, and making key decisions about their involvement in the project. Women have been empowered to facilitate community action: fifty percent of WATSAN committees were women, and 35 percent of this group held management positions. The capacity of the private sector and NGOs has increased such that they have been able to provide technical assistance to communities and towns (Batir, 2007).

Finally, considerable progress has been made in decentralizing governance of water supply and sanitation. Many districts are now supporting the operating costs of their water and sanitation teams. The CWSD has been converted into an autonomous agency and the project have also raised awareness about personal hygiene, water use, waste disposal and erosion, and created demand for WATSAN committees to address environmental issues such as deforestation and proper land use.

The donor agency (IDA) specified key aspects of the institutional structure of this project and takes a lead role in monitoring and enforcing project rules as well as coordinating among other stakeholders. Hence incentives for performance depend upon the active involvement of the donor. A related risk is that at present community capacity building for water and sanitation is heavily subsidized by

donor grants and loans. This financial structure constrains the ability to scale-up this project. These constraints might be diminished by incorporating alternative finance mechanisms such as publicly insured loans to communities, forming public-private infrastructure ventures, assisting credit-worthy local governments with bond issues, among others (Batir, 2007).

The CWSP-1 used policy reforms as an opportunity to build capacity for decentralized governance in all sectors of society. Rather than waiting for additional policy reform, the project was implemented in a less than perfect policy environment and has stimulated subsequent institutional evolution and change. The programme design stimulates entrepreneurship, political activity, civic involvement, and institutional development at local, district, and national levels. It also builds capacity for professional public sector management and self-help at the community level (Operational Manual CWSP2, 2000).

It also stimulates the market for management, consulting, engineering and semi-skilled labour at local, regional, and national levels. However, a significant portion of this is going into NGOs, which is not taxable and potentially competes with private sector firms. The project design creates incentives for private sector consulting firms to form non-profit organizations and evade tax on a portion of revenues. While the project stimulates the market for consulting to and constructing small water and sanitation systems, in the medium-term it crowds out private sector investment in providing and producing water and sanitation across communities within districts using alternative technologies.

The CWSP-1 in the Builsa district was instituted a year after the project had commenced nationwide. A district water and sanitation team (DWST) was put in place to manage rural water supply in the district. However, it was not until 1998 that offices were allocated to the DWST to start full operation in the district. During the period 1995 to 1998, the project was mainly focused on putting in place the structures required for guaranteeing a successful project. The period witnessed the selection and training of four area mechanics and WATSAN committees in all hand-pump communities which were to form the core of the management structure of the CWSP at the local level in the district. The period 1994 to 1999 was also characterised by the rehabilitation of existing water supply facilities in the various hand-pump communities. Thus with the necessary institutional structures finally put in place in the district, 132 new hand dug wells, and one small town piped system (in Sandema township) were constructed. A total of 178 existing water supply facilities were rehabilitated, and 310 existing and new water points (boreholes and hand dug wells) were converted to community management by the end of the project in June 1999. Additionally, the project selected and trained 1058 WATSAN committee members for the rehabilitated boreholes and 792 WATSAN committee members for the new hand dug wells in the district (Field data, 2008).

Community water and sanitation project II (CWSP-2)

In 2000, the second Community Water and Sanitation Project (CWSP2) was initiated with support of a World Bank IDA credit of US\$21.9 million. The

project built on lessons learned from the first Community Water and Sanitation Project (CWSP1) and adopted a large scale decentralization approach in the planning, implementation and management of water supply and sanitation (WSS) services in Ghana. The development objective of the CWSP-2 was to increase access and achieve effective and sustained use of improved community WSS services in villages and small towns in four regions in Ghana. CPWS-2 provided grants to communities and schools through their District Assemblies to construct WSS facilities. Under the project, communities submitted proposals to their respective District Assemblies (DAs), which went through a process of appraisal before providing the proposed facilities. This ‘demand-driven’ approach provided a good basis for strengthening communities’ ownership and management as well as sustainable operation and maintenance. Technical assistance and community development activities for public, private and civil society entities ensured adequate implementation capacity in critical areas such as procurement and financial management, planning, monitoring and evaluation, project and contract management. Water and Sanitation Committees (WATSANs) were set up to engage actively with NGOs, private sector providers and the DAs in all stages of the subproject to make informed choices on appropriate levels of service. The WATSAN committees had a gender balanced membership (Operational Manual CWSP-2, 2000).

An important feature of the project was the decentralized approach to rural WSS services delivery which placed Districts in the driving seat of implementation. Districts are able to respond more effectively to the local needs.

However, at the start of the project the implementation capacity was relatively weak. District Assemblies (DAs) tended to select more communities for subprojects than they could possibly support in a given period of time. This created high expectations among communities, and drew the attention to the need to strengthen the planning capacity at the district level. A learning-by-doing approach to capacity building was adopted, centred on the operationalization of planning tools, such as the Annual District Water and Sanitation Plan. The central Community Water and Sanitation Agency (CWSA) provided a well-coordinated programme of capacity building and strong follow-up support and technical assistance. The learning curve for the Districts was steep, and the approach eventually resulted in stronger local capacity for service delivery (Operational Manual CWSP-2, 2000).

According to the Water Supply and Sanitation Sector Board of the World Bank (2006), at the end of the project (CWSP-2) in 2004, nearly 800,000 people in rural communities were served with potable water nationwide. Over 2,000 communities in Ghana were assisted in this project and managed to adequately use and maintain their water facilities. All these communities participated in the planning, proposal formulation, implementation and management of their facilities. CWSP-2 provided training to over 500 service providers which operated at the district or the community level. Training of District Assemblies, private sector, and NGOs was conducted to ensure a strong long-term delivery of pump spare parts, equipment and services to communities. About 120 District Assembly staff received various forms of training ranging from computer literacy and

financial management coaching to supervision of latrine and hand dug well construction.

The CWSP-2 was a build up of the CWSP-1 in the Builsa district with increased hand-pump community sensitization on proper sanitary practices at pump site, proper usage of water facilities, the need to maintain water facility, the need to make financial contributions for pump maintenance, community bank accounts for safe keep of funds meant for pump maintenance, among others.

The CWSP-2 also established a spare parts shop to make parts readily available in the district. In addition, the CWSP-2 in the Builsa District constructed 145 hand dug wells, and 73 new boreholes and 39 hand-pump wells. The project also trained 672 WATSAN committee members for the water supply facilities and 870 WATSAN committee members for the new hand dug wells in the district. It is important to note that the water point projects under the CWSP-1&2 were funded mostly by the World Bank, CIDA, UNDP, EU, UNICEF, USAID, the District Assembly and Community Based Rural Development Projects.

CHAPTER FIVE
MAINTENANCE STRUCTURE OF THE BUILSA RURAL WATER
SUPPLY PROJECT

Introduction

The rural water supply project in the Builsa District was fashioned along the National Community Water and Sanitation Project (NCWSP), which was designed in the late 1980's and implemented in 1994. The NCWSPs operation was in two phases -that is the CWSP-1 from January 1994 to 2000 and Phase-2 was CWSP-2 from 2000 to 2008. A three year pilot project was carried out in Bolgatanga called "The 50 Well Project" in July 1988 with funding from the Canadian International Development Agency (CIDA). However, it was not until 1994 that the project was implemented in the remaining districts of the Upper East Region.

The main task of the project was to provide cheap and safe water supply to communities and also transfer management responsibilities of maintenance of the water supply facilities to the communities. It was therefore, imperative to develop strategies to enhance capacity building in knowledge, skills and problem resolution methods at the community level (Yanore, 1995). The primary focus was the hand-pump communities, using a combination of recognized traditional, political and social organizations as entry points.

To achieve the commitment of the communities before the provision of the water supply facilities and to guarantee the maintenance of the water facilities, a number of meetings were held with the communities in the Builsa district. These meetings were organized by the District Water and Sanitation Teams (DWST) under the supervision of the regional CWSA and the Builsa District Assembly. These meetings included the district information meeting, the village sensitization meeting, the community mobilization meeting, the decision making meeting, the water committee meeting and training. In all these meetings, the beneficiary communities were made aware of their responsibilities towards the water project. They were also educated on the presence of area mechanics and spare parts dealers in the district to help facilitate effective maintenance of the water supply facilities. To this effect, beneficiary communities with water supply facilities already in existence were to comply with the following:

- Open a bank account at the Builsa Rural Bank where annual tariffs designated for water supply facility maintenance and repairs would be deposited.
- Set up water Committees or Water and Sanitation (WATSAN) committees to manage the day to day operation and maintenance of the water facilities. The WATSAN committee comprised a chairman, a treasurer, a secretary, two care takers, and two women responsible for sanitation at pump site.

However, communities which needed new water supply facilities were to comply with the following requirements:

- Make an application to the engineer of the district water and sanitation team (DWST) to be forwarded to the regional CWSA in Bolgatanga for consideration.
- Open a bank account in the Builsa rural bank purposely for saving annual tariffs for water supply facility maintenance.
- Form a WATSAN committee for water facility maintenance.
- Provide five percent of the cost of the water supply facility.
- Finally, provide labour during the installation of the water supply facility.

With support from the CWSA a spare parts shop was established in Sandema to help make spare parts available for both maintenance and repairs of the water supply facilities.

During the animation process, the District Water and Sanitation Team (DWST) enlightened the communities on the existence of the private area mechanics and the spare parts shop in Sandema. The area mechanics are artisans selected by the District Assembly and trained by engineers from the CWSA to carry out major repairs and maintenance of the water supply facilities in the various hand-pump communities. The area mechanics received tools to aid in their work after their training. Thus, the analysis in this chapter covers the discussion on the maintenance structure as it exists in the Builsa district rural water supply project.

Maintenance structure

The maintenance structure put in place by any water supply facility implementing agency is very crucial to the functioning and sustainability of the water facility. The maintenance structure embedded in the Builsa rural water project is comprised of four important actors, that is; the District Water and Sanitation Team (DWST), the area mechanics, the spare parts dealer, and, the WATSAN committees. The four main actors work together as a team but most importantly the DWST serves as a supervisory body to the WATSAN committees. Figure 3 illustrates the maintenance structure of the District Rural Water Project.

The composition is a decentralized form of ensuring effective maintenance of the water supply facilities in the district. There is a strong inter-relationship among the various actors. For instance, in the event of a breakdown in the water supply facility, the WATSAN committee immediately informs the area mechanics for their expertise and the spare parts dealer for spare parts to carry out repairs. Thus, each of the actors has an important role in ensuring the long-term sustainability of the water supply facilities. It is important to point out that, in the maintenance structure, the first group or actor to contact when there is a breakdown in the pump community is the WATSAN committee.

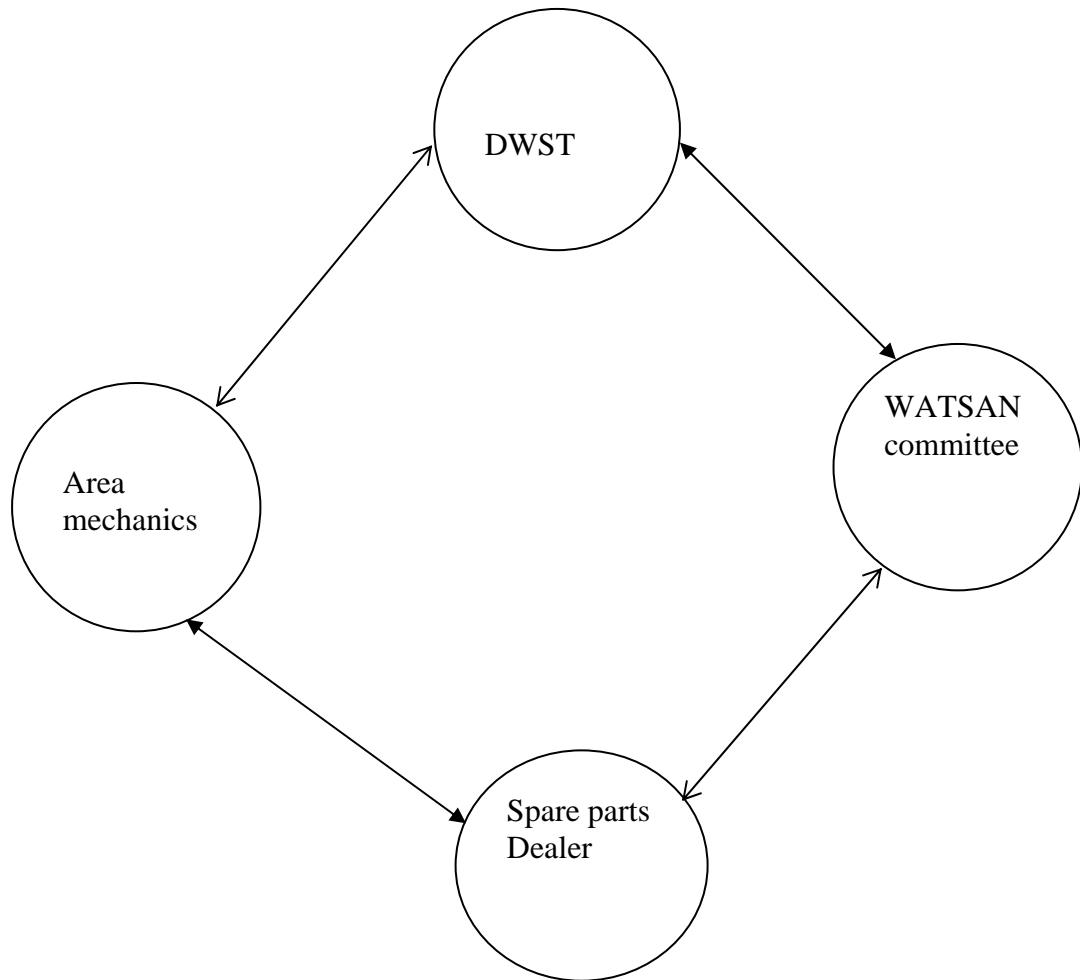


Figure 3: Maintenance composition of the Builsa rural water project

Source: Field Data, 2008

District water and sanitation team (DWST)

The DWST forms an integral part of the structure of the CWSA under the NCWSP. The DWST works directly under the regional water and sanitation team (RWST) and the District Assemblies (DA). The DWST is responsible for the delivery, monitoring and evaluation of water and sanitation facilities at the district

level. The team is also responsible for providing private sector support in the water and sanitation sector of the district (that is, the area mechanics and spare parts dealers). This further explains the crucial role the DWST plays in the structure of district rural water supply project as stated earlier.

The Builsa District water and sanitation team is a ten-member team composed of a team leader, a water engineer, community development officer, hygiene and sanitation officer, and six field officers. The team leader (who is the head of the DWST) oversees the activities of members of the team. The team leader also advises the District Assembly on the state of the water supply and sanitation facilities in the district and submits progress report to the RWST, the CWSA and any other partner agencies.

The water engineer of the DWST is responsible for monitoring and supervising water supply related activities in the district. He also provides technical back-stopping to the area mechanics and WATSAN committees in the district. Finally the engineer co-ordinates with RWST, the CWSA and other partners such as international donor agencies and NGOs in the rural water supply sector in the district.

The hygiene and sanitation officers render expert advice on water and sanitation to the communities. They are mostly associated directly with the water supply facilities since they are mostly working at the household level to ensure that community members practice personal hygiene in the use of water and effective sanitation practices.

The community development officer of the DWST serves as a link between the community and District Assembly on one hand, and the team leader of the DWST on the other hand. The community development officer is responsible for mobilizing community members through the chairmen of the WATSAN committees for community sensitization programmes and other programmes that required community meetings. The community development officer is also responsible for ensuring that communities adopt a better financial mobilization and management system that will guarantee a long term sustainability of the water supply facilities.

The DWST had a total of six field officers in charge of all the communities in the district. Basically, the field officers were responsible for inspecting water facility site, identifying worn-out pump parts, and disinfection of open wells and wells fitted with hand-pumps. Finally the field officers offered education on pump site sanitation techniques as to how to frequently check on the water facility as well as the need to maintain community bank account.

The DWST supervises the WATSAN committees to ensure that the surroundings of the water facility are clean and that the facility is properly used. The DWST also ensures that the WATSAN committees service the water supply facilities regularly and ensure effective maintenance of the facilities. The field officers of the DWST visit all the water supply facilities in the district regularly to ensure that pump communities comply with their directives, particularly keeping the surroundings of the water facility clean.

The DWST at the time of survey was in charge 290 water supply facilities in the district. This figure was composed of 234 boreholes and 56 wells fitted with hand-pumps. Out of this number, eighteen of the water supply facilities were broken down due to lack of periodic maintenance, non-availability of some spare parts in the region and poor yields.

It was revealed that the DWST periodically organizes refresher training for area mechanics. However, for the past three years none of such refresher training has been organized for the area mechanics. The DWST was responsible for the training of WATSAN committees through the area mechanics and also ensuring that spare parts dealer sell parts at the CWSA approved rates. Further, the team also supports communities financially where the price of a spare part exceeds GH¢ 200.

Strengths of the DWST

The DWST was established during the CWSP-1 to serve as a representation of the RWST and the CWSA at the district level. The task of the DWST is to supervise and monitor the construction and maintenance of water supply and sanitation facilities.

As stated previously, the Builsa DWST had staff strength of ten professionals who attended refresher training once a year. These refresher programmes were meant to keep the staff abreast with the current techniques of water and sanitation facility management and maintenance. Staff of the team had

three spacious offices with computers (six desk tops and two laptops) for their work.

The team received an annual budgetary allocation of USD 3000.00 from the CWSA and the District Assembly to cater for their annual programmes in the district. Further, the team was also provided with tools and three motorbikes to help facilitate easy transportation around the communities. Finally, a remarkable strength of the DWST over the years was the tremendous support they received from the area mechanics, spare parts dealer and WATSAN committees in the district.

Challenges faced by the DWST

Like any other institution, the DWST encountered a number of challenges that seriously hampered its ability to deliver the requisite services to the hand-pump communities in the district.

Firstly, the team had insufficient logistics to carry out their duties. The entire Builsa District was assigned three motorbikes for both office errands and field work. The motorbikes were insufficient for the ten member staff. Further, at the time of the survey, two of the three motorbikes had not been functioning for a period of four months. This was due to varying mechanical problems. One of the field officers disclosed that the team has not been to the field for close to six months due to the unavailability of a means of transport. This development has a huge implication on managing the maintenance of the water supply facilities in the various hand-pump communities since the field officers rarely visited the

communities and if at any time they did visit, they only concentrated on near-by hand-pump communities to the detriment of those communities farther away. Additionally, it was revealed that the DWST did not have a laboratory of its own to carry out water quality analysis. According to the water engineer, it took several months for water quality tests to be carried out since they had to travel to Bolgatanga to perform the analysis. The delay was attributed to pressure on the laboratory facility in Bolgatanga. Thus, the team was not able to carry out regular or periodic analysis of water quality in the district due to the tiresome procedures that had to be overcome, coupled with the non availability of a reliable means of transportation to convey samples to Bolgatanga for analysis.

Secondly, the level of motivation of the DWST staff had been very low if not non-existent. Members of the team complained of low salaries, non payment of allowances for the past eight years, and lack of fringe benefits. This was a major disincentive to the DWST and discouraged them from visiting the hand-pump communities. The consequence on the maintenance of the water supply facilities was that the activities of WATSAN committee members in the various hand-pump communities were not being monitored and supervised.

Thirdly, the team's head complained of delays in the release of funds from both the CWSA and the District Assembly. Budgetary allocations to the team were released very late, mostly at times that a greater portion of their annual schedule had elapsed. Coupled with the delay in the release of budgetary allocations was the insufficient nature of the money. Budgetary allocation to the DWST was not sufficient to cover the expenses of the team. For instance, at the

time of the survey two of the three motorbikes allocated to the team were grounded at a mechanics garage for the mere reason that the team did not have enough funds available to purchase the spare parts needed to repair the bikes. It was also discovered that due to financial constraints, the DWST was not able to organize, on regular basis, water and sanitation sensitization programmes in the various hand-pump communities.

Fourthly, a critical factor that posed a major threat to the work of the DWST was the issue of political interference and political partisanship within members of the DWST and staff of the District Assembly. A staff of the DWST disclosed that their work had become more of individualistic instead of a team work. There was also a high degree of job disruption and side-lining of members perceived to be sympathizers of particular political parties. For instance the community development officer had to resign citing reasons of political interference.

Finally, as part of the restructuring of the rural water supply and maintenance strategy of the CWSA, the training of WATSAN committees members in the district was made the sole responsibility of the private company's contracted to drill and install the water supply. The result of this directive was that WATSAN committees were either not sufficiently trained or never received any form of training. There was a high turnout of poorly trained WATSAN members, particularly in Wiaga Guuta, Siniensi and Dogninga, which contributed immensely to the poor maintenance of the water supply facilities. This kept a

huge work load on the DWST since they had to carry out the training again in the affected hand-pump communities.

Area mechanics/care takers

The area mechanics are mostly artisans trained to repair the water supply facilities in the event of a breakdown. The area mechanics actually work on the underground parts of the pump. Area mechanics also carry out routine replacement of worn-out and faulty parts in the water facility. However in every hand-pump community, a care taker chosen from the WATSAN committee and trained to carry out minor repairs or servicing of the water facility. The responsibilities of the caretaker include greasing of pump bolts, joints spindles, and replacing of external wearing parts. The caretaker is only responsible for the day-to-day care of the water facility, but he or she does not have the expertise to work on the underground parts of the water supply facility.

Background of area mechanics

The selection of the area mechanics in the Builsa District was based on a strict and well structured criterion under the NCWSP. The procedure included the presentation of application letters and certificates, written examination, practical test on basic knowledge in mechanical works and finally an interview session. At the end of the selection process in 1997 four applicants were selected and trained as area mechanics for the Builsa District. However, two of the area mechanics abandoned the job three years after their training (that is the year 2000). At the

time of the survey, there were only two male area mechanics in the Builsa District and both of them were interviewed to ascertain their contribution towards the maintenance of the water supply facilities, the problems they encounter in the discharge of their duties, the relationship between them and the WATSAN committees on one hand and the spare part dealers on the other hand. Of the two area mechanics, one was based in Sandema and the other in Uwasi. They were both literate, aged 34 and 38 years respectively, and were both married with children.

The two area mechanics interviewed engaged in other economic activities like farming, masonry and rearing of animals particularly pigs as supplementary economic activities to their jobs as area mechanics. The area mechanics were given tools after their training programme to aid in the execution of their duties.

Repair activities

The maintenance of the tools was the sole responsibility of the area mechanics. Repair activities varied from period to period. For instance, the number of repair activities in the dry season far outnumbered that in the wet season. In most pump communities water facility breakdown is more frequent in the dry season due to the increase in usage during that period for building and other domestic use. Since repair activities were done on an informal basis, the area mechanics did not keep records on repair activities. However, the area mechanics were able to provide an estimation of their repair activities for the past

four years. Table 5 compares the trend of repair activities by the area mechanics between 2004 and 2007.

On the average each of the area mechanics conducted 20 repairs in 2004, 26 repairs in 2005, 35 repairs in 2006, and 57 repairs in 2007. However, Table 6 clearly indicates that the area mechanic in Sandema has for the past four years undertaken more repair activities than his colleague in Uwasi.

Table 6: Repair activities over a four year period

Area mechanic	Number of repair activities			
	2004	2005	2006	2007
Sandema	25	33	49	69
Uwasi	15	19	20	44
Total	40	52	69	113

Source: Field data, 2008

While the repair activities were increasing over the years, the repair charges also increased yearly according to the distance of the hand-pump community to the work shop of the area mechanic. Table 7 shows the repair charges and distance covered from 2006 to 2007.

Table 7: Distance and repair charges

Distance (km)	Charges (GH¢)	
	2006	2007
< 1	5.0	8.0
1-10	10.0	14.0
11-20	15.0	20.0
21-30	20.0	25.0
> 30	25.0	35.0

Source: Field Data, 2008

The hand-pump communities are charged for repairs on the basis of the distance covered by the area mechanic to the community. For instance, in 2006 and 2007, hand-pump communities within the distance of less than a kilometre paid GH¢5 and GH¢8 respectively, while hand-pump communities within a distance greater than 30 kilometres within the same periods paid GH¢25 and GH¢35 respectively. Hence the amount charged per repair is tied to the cost of transport or the distance covered to the affected hand-pump community.

Calculation of repair charges

The repair charges of the area mechanics comprise three main components namely; workmanship, transportation and tools maintenance. The area mechanics charged for workmanship on the basis of their hourly labour rate and the time spent in repairing the faulty pump. The transportation component of the charge

was calculated based on the distance travelled to and from the hand-pump community.

The amortization cost for tools was calculated per repair. Using the historical cost of the tool spread over its estimated life span (mostly 5 years), an average charge per repair per year was calculated by the area mechanic to the hand-pump community. However, the life span of some tools did not last even up to a year due to the higher frequency of usage. The computations of charges became very necessary because apart from the financial reward for rendering their service to the pump communities, the area mechanics had to maintain and replace tools from time to time. The survey revealed that the average expenditure on maintenance of tools in 2007 was between GH¢10 and GH¢20.

However, since the project did not provide the area mechanics with any form of transportation, they were usually forced to board public transport or rent a motorbike. Thus, on each trip the average amount spent on a rented motorbike costs anywhere around GH¢10 in 2007. This amount included fuel cost.

From the survey, one out of the two area mechanics had preventive arrangements with 3 pump communities in the district and visited these communities once in every three months. The area mechanics indicated that they did not save any portion of their charges for future use in aid of their work. This attitude of the area mechanics has maintenance implications on the future sustainability of the water supply facilities in the hand-pump communities. The ideal situation would have been for them to make regular savings towards the

purchase of new tools and motorbikes that would facilitate easy transportation and efficiency in the discharge of their duties.

Relationship between area mechanics and spare parts dealer

The area mechanics enjoyed a very cordial relationship with the spare parts dealer in the district. However, there was the problem of a shortage of certain spare parts which made their work quite difficult. Hand-pump communities had to travel to Bolgatanga, Tamale, Kumasi, and sometimes Accra before getting the required parts. The area mechanics revealed that there was no regular supply of parts in the spare parts shop, hence they (area mechanics) were forced to travel long distances in search of spare parts from shops located outside the Builsa District. Apart from the inconvenience created by the long distance travel, the shortage of spare parts from the shop also led to a situation of mistrust between the area mechanics and the WATSAN committees of the hand-pump communities in need of the parts. The distance from the shop of the area mechanic in Sandema to the spare parts dealers shop is about half a km. However, the area mechanic in Uwasi has to travel a distance of about 45km to Sandema before having access to spare parts.

Another issue of great concern to the area mechanics and the communities was the spontaneous rate at which spare parts prices increased. For instance, according to the CWSA approved spare parts price list for 2006 and 2007, a "cylinder with brass liner" and "foldable spanner" in 2006 (both for an Afridev pump) cost GH¢ 50.20 and GH¢ 7.40 respectively. The corresponding prices in

November 2007 were GH¢ 78.23 and GH¢ 10.69 respectively. This represented a 35.8 percent and 30.8 percent price change respectively over the 2006 prices.

Problems encountered by area mechanics

The major problem faced by the area mechanics in the Builsa District is the unavailability of a reliable means of transport. The area mechanics in the district were not provided with motorbikes or any form of transportation after their training programme. This has been a major setback in their quest to carry out their duties. The area mechanics are forced to use public transports or rent motorbikes whenever they are called upon to render services to any pump community. The consequence is a delay in response to repair faulty water supply facilities. The survey revealed that 55.1 percent of the water users indicated that it took one whole week between the period of report of water facility failure and the maintenance time. Further, 15.9 and 3.6 percent of the water users reported a delay period of two weeks and three weeks respectively to repair faulty water facilities. The difficulty area mechanics go through before executing their duties does not motivate any individual to take up the job of being an area mechanic in the district. The problem will continue to exist unless some form of external support is brought in to provide motorbikes to the area mechanics.

Another problem faced by the area mechanics in the district was the system of credit payment practised by most of the WATSAN committees in the hand-pump communities. The area mechanics had to re-visit the hand-pump communities several times before payments were made. In some cases, the

WATSAN committees went to the extent of paying less than the agreed amount to the area mechanics. This habit of the WATSAN committees discouraged the area mechanics from going to hand-pump communities or responding punctually in the event of a breakdown.

The scarcity or shortages of spare parts have been another problem area mechanics faced in the Builsa District. With only one spare part shop for the entire district, any shortage of spare parts in that shop implied the area mechanics had to travel to Bolgatanga, Tamale, Kumasi or Accra to purchase parts. This resulted in delay in the repair of faulty water supply facilities.

Additionally, the road network to the hand-pump communities are third class roads which were in bad shape and in some cases inaccessible. Further, the dispersed nature of pump communities made it difficult for the area mechanics to travel there. This also discouraged the area mechanics since very often they are compelled to walk for longer distances from the main road before locating the faulty water facility.

Spare parts dealer

The spare parts dealer plays an important role in the maintenance structure. The CWSA set up a spare parts distribution point in Bolgatanga, the regional capital. The agency also assisted in establishing a spare part shop in Sandema to serve the entire district. Prices for spare parts are normally determined by the CWSA and handed over to the spare parts dealer. Thus, the spare parts shop in Sandema is privately owned but was selected based on the fact

that Sandema is the district capital and all the surrounding hand-pump communities do their shopping there. On the average, all hand-pump communities in the district that buy spare parts from the shop were within a 30km radius.

Retail activities

The major trading activity of the spare parts dealer was the sale of used bicycles. The sale of spare parts was a supplementary activity because spare parts sales did not turn in any significant financial earnings. The spare parts dealer got his supplies from Water Vision Technology (WVT), a non-governmental organisation based in Bolgatanga. Water Vision Technology is a local organization that serves as a distributor of pump spare parts in the Upper East Region. The organisation has its headquarters in Tema where pump spare parts imported into the country are distributed to their branches nationwide. However, the activities of WVT are monitored by the regional CWSA to ensure that pump spare parts are sold at the CWSA approved prices to the spare parts dealer.

The WVT representative in Bolgatanga visits the spare parts shop at the end of every quarter to take stock of spare parts sold and what needed to be replaced. The spare parts dealer had a commission of 25 percent calculated on total sales on WVT's parts quarterly, and this is paid to the spare parts dealer directly. This arrangement has been very lucrative to the spare parts dealers, since the number of sales he makes increases his income at the end of every quarter. It is important to mention that apart from WVT, the spare parts dealer could buy

parts from other sources to stock his shop but these spare parts must be sold at the CWSA approved prices.

Sales were mostly on the ascendancy in the dry season. This was attributed to the high pump failure rate during the dry season as a result of increase in water facility usage. Further, sales also increased from one year to the other. For instance, in 2005, total sales was GH¢392 while in 2007 total sales increased to GH¢510 indicating a 23 percent increase sales over 2006. Additionally, the variation in sales between the two years (2006 and 2007) was partly attributed to the high pump failure rate recorded in 2007 due to the long dry season. Secondly, the survey revealed that due to the continuous usage of water supply facilities without routine replacement or servicing of parts that need to be replaced or serviced after every six months, most of the water supply facilities in the district are beginning to experience a high failure rate due to multiple faults.

The prices of spare parts was identified as a major factor that caused problems between the area mechanics and pump communities or WATSAN committees on one hand and the spare parts dealer on the other hand. The survey revealed that 73.7 percent (15 WATSAN committees) of WATSAN committees had problems with the spare parts dealer due to price hikes. However, it is important to note that the manufacturers of these pumps (mostly the Afridev and Nira pumps) determine the prices of the spare parts based on international standard, which is the dollar equivalence. This has been a major factor accounting for the price hikes of spare parts, since the dollar-cedi equivalence keeps fluctuating. For instance, the prices of spare parts in 2006 ranged from GHp 10

for the least part to GH¢ 114.10 for the highest priced part, and that of 2007 ranged from GH¢ 20 for the least part to GH¢ 210.20 for the highest priced part. Table 8 shows the trend of prices of four commonly used parts in the last four years.

The increase in prices of spare parts and the high cost of repair charges over the years provides a clue that pump communities should establish an effective mechanism for generating funds for maintenance of their water supply facilities to ensure sustainability. By this, pump communities will be able to meet all the maintenance expenses in the future.

Table 8: Trend of prices of four most commonly used parts over the past three years

Parts	2004	2005	2006	2007
	GH¢	GH¢	GH¢	GH¢
Bobbin Valve	0.50	0.82	1.00	2.50
Foot Valve Receiver O-Ring	0.70	1.00	1.50	2.40
Spring Cutter	3.50	3.90	4.60	6.00
Rod Plug	6.00	7.70	10.75	17.00

Note: GH¢1= \$1.3

Source: Field Data, 2008

Water and sanitation (WATSAN) committees

The water and sanitation (WATSAN) committee is a committee that is selected by the pump community and trained by members of the district water and sanitation team (DWST) and charged with the responsibility of ensuring the day-to-day operation and maintenance of the water supply facilities. Kendie (1992) opined that managing a rural water supply project successfully means operating and maintaining a system on a day-to-day basis so that it continues to work and supply water as planned. This was the rationale behind the establishment of the WATSAN committees by the project implementers to ensure sustainability of the water supply facilities.

This subsection of the discussion looked at the structure of the WATSAN committees in the various hand-pump communities, the mode of financial mobilization and financial management adopted by the committees, water facility maintenance, the benefits and problems associated with the provision and management of the water supply facilities in the surveyed hand-pump communities. Finally, the issue of bye-laws meant to guarantee efficient usage of the water supply facilities was examined from the perspective of the 10 surveyed hand-pump communities.

Structure and stability of WATSAN committees

A successful operation and maintenance (O&M) is attained on the basis of strategic planning and implementation of effective managerial strategies and techniques. This means there is the need to put in place competent managers

charged with the responsibility of ensuring continues delivery of water in a sustainable manner.

The survey revealed that all WATSAN committee members were selected by their respective communities based on a criterion of proximity to the water supply facility. Of all the WATSAN committees in the various hand-pump communities, 80 percent (8 committees) of these committees were composed of four males and three females. The remaining 20 percent (2 committees) of the committees were composed of five males and two females. This contradicts with the literature that women were fairly represented in the WATSAN committees (Project Operational Manual, CWS-2, 2000). The various positions for the membership in each WATSAN committee were made of a chairman, treasurer, secretary, two caretakers, and two women in charge of sanitation. Members of the committee occupying these positions had their specific responsibilities towards achieving the overall goal of managing the use of the water facility as well as ensuring its maintenance.

The survey revealed that the WATSAN committee membership attrition rate was on the ascendancy. Of all the WATSAN committee members surveyed, 71 percent (14 members) of them indicated that they had lost some of their original members. However, 29 percent (6 members) indicated that they had all their committee members intact. The rate at which replacement was carried out was higher for males than females. The corresponding percentages were 78 percent for males and 22 percent for females. It was found out that many or most of these pump communities had very little interest in embarking on a replacement

exercise. The departure of WATSAN committee members was due to various reasons. Table 9 presents the reasons for the departure of WATSAN committee members in all the 10 communities the survey covered.

Table 9: Reasons for leaving WATSAN committee

Reasons	Frequency	Percentage
Death	4	20.0
Not economically beneficial	9	45.0
Resettlement	2	10.0
Others	5	25.0
Total	20	100.0

Note: n=20 WATSAN committee members

Source: Field Data, 2008

It was very clear that members of the WATSAN committees left the job for the mere fact that the work was not financially beneficial or rewarding to them. This accounted for 45.0 percent. However, 25.0 percent of the departures was attributed to health problems, old age, engagement elsewhere and resignations due to mismanagement of pump community funds. Further, 20.0 percent of the departures were due to the death of members, while 10.0 percent was as a result of resettlement mostly associated with females who go into marriages elsewhere or due to divorce.

On the whole, the rate of departure of members of the committee was greater for the males than their female counterparts. One major reason was the

fact that the male composition was greater than the female composition. Additionally, the males had financial pressures from their families which forced them to engage in ventures that were more financially rewarding. The female members of the committees were more stable due to maternal responsibilities.

Financial mobilization

The WATSAN committees are tasked with the responsibility of ensuring effective and sustainable management of the water supply facilities in their communities. It is an undeniable fact that the availability of funds plays a crucial role in the quest to effectively manage a water supply facility. It is the duty of the WATSAN committee to devise an effective and sustainable financial mobilization strategy that will ensure that funds are readily available at all times to take care of expenses in the event of a breakdown. Furthermore, funds are also needed to purchase parts that need to be replaced quarterly.

The proposed mode of financial mobilization for all the pump communities by the CWSA was an annual contribution (tariff system) per person that will be put in a community bank account. Far from the ideal situation, most of the communities devised their own ways of financial mobilization for water supply facility maintenance. The survey examined the various modes or types of financial mobilization and financial management practices adopted by the various WATSAN committees in the district. Interestingly all the pump communities surveyed in the district practised one of the following two modes of financial mobilization; that is, the annual tariff system, and the system whereby

contributions are made when the water facility breakdown. Table 10 shows a cross tabulation result of the 10 hand-pump communities surveyed and the two commonly used modes of financial mobilization for facility maintenance.

Table 10: Financial mobilization systems for water supply facility maintenance

Community	Annual Compulsory		Contribution when		Total	
	Tariff System		Pump Breaks down			
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Akpiayeri-						
Guuta	-	-	18	13.0	18	13.0
Azugyeri	15	10.9	3	2.2	18	13.0
Dilogsa	-	-	11	8.0	11	8.0
Forinsa	-	-	12	8.7	12	8.7
Wiaga-						
Guuta	-	-	12	8.7	12	8.7
Longsa	6	4.3	8	5.8	14	10.1
Siwarin-						
Daasa	10	7.2	-	-	10	7.2
Tiendema	9	6.5	6	4.3	15	10.9
Wupiensa	-	-	14	10.1	14	10.1
Zundema	8	5.8	6	4.3	14	10.1
Total	48	34.8	90	65.2	138	100

Note: n= 138

Source: Field Data, 2008

The dominant mode of financial contribution towards water supply facility maintenance in all the 10 hand-pump communities was when the pump breaks down. The results from Table 9 show that 65 percent (90 water users) of the water users in the various hand-pump communities made contributions only when the water supply facility breaks down. Out of the 65 percent, Akpiayeri-Guuta of Siniensi was the worse amongst them with 13 percent, followed by Wupiensa of Dogninga which recorded 10 percent. This mode financial mobilization did not guarantee the ready availability of funds for maintenance and repairs. With this mode of financial mobilisation, WATSAN committees had to call for meetings anytime the water facility breaks down to decide on the amount each person would contribute based on the price of faulty part and the charges of the area mechanics. The survey revealed that hand-pump communities adopted this mode of financing the maintenance of the water supply facility because of the apathy of community members towards the annual tariff system. Further, community members complained of scarcity of money to make annual tariff payments. The survey also revealed that hand-pump community members did not trust their WATSAN committee members on the grounds of financial mismanagement, and hence were not willing to adopt the annual tariff system. For instance in Wiaga-Guuta, the community had to adopt this system of funding because the WATSAN treasurer was alleged to have embezzled tariff contributions that were put in her care. The consequence of this system of funding was that it sometimes took several weeks or months before a faulty water supply facility could be repaired, particularly in instances where there was the need to replace a major part. For

instance, a Nira borehole in Wiaga-Feringa had a worn out “hand pipe” and functioned inefficiently for a period of five months because community members could not make enough contributions to cover the price of the part which was GH¢59.84. On the other hand, if the pump community had made previous annual contributions they would have had enough money in their bank account to buy the faulty part.

Finally, 35 percent (48 water users) of the water users indicated that they practised the tariff system of payment in which annual contributions are made per person or household and saved for maintenance purposes. This financing option for pump maintenance conforms to WHO’s “Flat Rate” system of financing the maintenance of water supply facilities. For most of these hand-pump communities, this system guaranteed the availability of funds for maintenance and repairs. However, in the event that the bills exceeded the amount the pump community had in its savings account, then there was the call for contributions to supplement the amount available. These contributions were normally very little compared to what the other communities practising the non-tariff system contributed.

Financial management

The next crucial responsibility of the WATSAN committee was how to manage the funds or financial contributions either received from tariffs or other forms of financial mobilization. The ability of the committee to effectively manage finances will determine whether or not funds will be readily available for

maintenance and repairs. The survey found out that there were two main modes of financial management utilized by all the communities surveyed. Pump communities had the choice of either saving their funds (that is either annual tariffs or contributions in the event of a breakdown) in the Builsa community bank or keeping the funds with the WATSAN treasurer or chairman. The two modes of financial management by the 10 surveyed communities are shown in Table 11.

One of the requirements or directives of the CWSA was for pump communities to open bank accounts in which financial contributions would be saved in order to guarantee the availability of funds for maintenance and repairs.

The survey revealed that only 30.4 percent (42 respondents) of the water users indicated that financial contributions were saved in a community bank account for future use. The remaining 69.6 percent (96 respondents) of the water users pointed out that financial contributions were kept with the WATSAN treasurer or chairman. Thus, the dominant mode of financial management amongst the hand-pump communities was the system in which funds are kept with the WATSAN treasurer. This mode of saving community funds was discovered to be inefficient since the security of the funds was not guaranteed. For instance, it was reported in Wiaga-Guuta that the hand-pump community had to replace the WATSAN treasurer on the grounds that she had misappropriated the funds. The practice of saving community funds with the WATSAN treasurer or chairman was contrary to the directive of the CWSA.

Table 11: Financial management system per pump community

Hand-pump Community	Community Bank Account		Savings with WATSAN Treasure	
Hand-pump Community	Frequency	Percentage	Frequency	Percentage
Akpiayeri- Guuta	0	0.0	18	13.0
Azugyeri	12	8.7	6	4.3
Dilogsa	0	0.0	11	8.0
Wiaga-Farinsa	0	0.0	12	8.7
Wiaga-Guuta	1	0.7	11	8.0
Longsa	8	5.8	6	4.3
Siwarin-Daasa	9	6.5	1	0.7
Tiendema	12	8.7	3	2.2
Wupiensa	0	0.0	14	10.1
Zundema	2	1.4	12	8.7
Total	42	30.4	96	69.6

Note: n= 138

Source: Field Data, 2008

Ironically, the mode of financial management determined the amount of funds each hand-pump community had available for maintenance and repairs at the time of the survey. Table 12, shows the amount of funds available to each community for pump maintenance.

Table 12: Average yearly earnings per community

Hand-pump Community	No. of Supply Facilities	Water Available Per Year (GH¢)	Funds Available Per Pump (GH¢)	Average Amount Per
Akpiayeri-Guuta	2	Nil	Nil	
Azugyeri	2	45	22.5	
Dilogsa	2	Nil	Nil	
Wiaga-Farinsa	2	Nil	Nil	
Wiaga-Guuta	2	20	10	
Longsa	3	50	16.67	
Siwarin-Daasa	4	100	25.0	
Tiendema	2	50	25.0	
Wupiensa	2	Nil	Nil	
Zundema	3	40	16.67	
Total	24	330	115.84	

Source: Field Data, 2008

The average yearly amount of funds available for water supply facility repairs and maintenance was higher for Siwarin-Daasa (GH¢ 100) with an average amount per pump of GH¢ 25.0. This figure was relatively better than the other pump communities surveyed. The average amount earned in a year for each of the pump communities was low compared to the amount spent in the purchase of spare parts and the charges of the area mechanics. This however implied that

pump communities had to make top up contributions in various amount in the event where the amount available is not enough to cover the total cost of repairs.

Further, the survey revealed that pump communities such as Akpiayeri-Guuta, Dilogsa, Farinsa and Wupiensa did not have money available because they made contributions only when their water supply facilities broke down. This system of funding rarely resulted in excess funds available, since community members only contributed the exact amount required to carry out repairs. However, on some occasions there were some surplus funds which were saved either by the WATSAN chairman or treasurer. One other disadvantage of the system was that communities did not have funds available to carry out routine maintenance of the water supply facility.

WATSAN committees and pump maintenance

The WATSAN committees are responsible for the day-to-day maintenance of the water supply facilities in their various pump communities. The number of water supply facilities under the care of each WATSAN committee in the district ranges from one to four facilities. Table 13 shows a distribution of the number of water supply facilities under the care of the WATSAN committees in the selected pump communities.

Table 13: Number of water supply facilities under the care of the surveyed WATSAN committees in the various communities

No. of water facilities	Frequency	Percentage
1	3	15
2	10	50
3	4	20
4	3	15
Total	20	100

Note: n= 20 WATSAN Members

Source: Filed Data, 2008

The survey revealed that 15 percent of the WATSAN committees managed one and four water supply facilities respectively, 50 percent managed two water supply facilities while 20 percent of the WATSAN committees were responsible for the day to day maintenance of three water supply facilities.

At the time of survey, eighteen of the water supply facilities in the sampled hand-pump communities were faulty. Of this figure, eight of the water supply facilities were broken down completely, while the remaining ten did not function up to standard due to worn out replaceable parts, improper use, and lack of facility servicing. Of the eight completely broken down water supply facilities, the duration of breakdown ranged between one week and five months. It was revealed that three of the broken down pumps have been out of order for less than a month, and the remaining five have been broken down for more than a month. Additionally, six out of the eight completely broken down water facilities were

installed between 1979 and 1985. Various reasons, as indicated in Table 14, were attributed to the breakdown of the water supply facilities.

Table 14: Reasons for the breakdown of water supply facility breakdown and associated prices of parts

Faulty parts	Frequency	Percentage	2007 Prices of parts (GH¢)
Faulty shock absorber	3	16.7	31.68
Worn out handle pipe	5	27.8	59.84
Worn out T-bar	8	44.4	42.99
Faulty sleeve bearing	2	11.1	66.88
Total	18	100	201.39

Source: Field Data, 2008

From Table 14, about 17 percent (3 water facilities) of the broken down water supply facilities had faulty shock absorbers. This particular problem is very peculiar to the Nira pumps. Further, 28 percent (5 water facilities) of the broken down water supply facilities was the result of worn-out handle pipes, while 44 percent (8 water facilities) of the faults were as a result of worn-out T-bar. The pump T-bar is a part of the "Nira pump" that also gets faulty after prolonged and careless usage of the water supply facility. It is however important to note that the T-bar is a very durable part that takes several years before wearing out. Finally, 11 percent (2 water facilities) of the faults in the broken down water supply facilities was as a result of a faulty sleeve bearing. The sleeve bearing is one of

the most expensive and scarce parts of the 'Nira pump'. The expensive and scarce nature of these parts could partly explain why some of the water supply facilities were broken down for more than a month without repairs. The prices of some of the parts far exceed the annual contributions of most of the hand-pump communities. This finding is consistent with Harts (1994) which opines that the use of simple technology and design will reduce maintenance cost and maximize operational efficiency for the hand-pump communities.

Thus, the breakdown of water supply facilities in the pump communities was attributed to the ineffectiveness of the WATSAN committees in the respective pump communities to mobilize funds for repairs, purchase of spare parts and routine maintenance of the water supply facilities.

Frequency of water supply facility failure

The various hand-pump communities surveyed provided different responses as to how frequent their water supply facility broke down in a year. Table 15 presents a distribution of the frequency of water supply facility failure in a year. It is clear from the table that Wupiensa of Dogninga experienced the highest number of water supply facility failure (3 times in a year).

Table 15: Frequency of water supply facility failure in a year

Hand-Pump Community		How often does your water supply facility develop a fault in a year				
		Never Broken down	Once a year	Twice a Year	Thrice a year	Total
Akpiayeri-	Frequency	-	1	17	-	18
Guuta	Percentage	-	0.7	12.3	-	13.0
Azugyeri	Frequency	12	5	1	-	18
	Percentage	8.7	3.6	0.7	-	13.0
Dilogsa	Frequency	-	7	3	1	11
	Percentage	-	5.1	2.2	0.7	8.0
Farinsa	Frequency	-	1	11	-	12
	Percentage	-	0.7	8.0	-	8.7
Wiaga-Guuta	Frequency	-	1	11	-	12
	Percentage	-	0.7	8.0	-	8.7
Longsa	Frequency	2	7	5	-	14
	Percentage	1.4	5.1	3.6	-	10.1
Siwarin-Daasa	Frequency	-	7	3	-	10
	Percentage	-	5.1	2.2	-	7.3
Tiendema	Frequency	-	15	-	-	15
	Percentage	-	10.9	-	-	10.9
Wupiensa	Frequency	-	-	9	5	14
	Percentage	-	-	6.5	3.6	10.1
Zundema	Frequency	8	6	-	-	14
	Percentage	5.8	4.3	-	-	10.1
Total	Frequency	22	50	60	6	138
	Percentage	15.9	36.2	43.5	4.3	100.0

Note: n= 138

Source: Field Data, 2008

About 44 percent (60 water users) of the water users said they experienced pump failure twice in a year, mostly in the dry season. Additionally, about 36 percent (50 water users) of the water users said their water supply facilities developed faults only once in a year. Further, hand-pump communities such as Azugyeri, Longsa and Zundema had never had their water supply facilities broken down since installation.

The breakdown of the water supply facilities meant there was the need for area mechanics to rectify the faults. The period between report of water facility failure and the response of the area mechanic varied from one hand-pump community to the other. Two main factors determined how early a water supply facility would be repaired in the event of a breakdown. These factors are: the proximity of a hand-pump community to the area mechanics shop and the availability of funds to purchase spare parts and also pay for repair charges. Thus, the response rate varied between three days and four months. Table 16 presents the response rate in the event of a water supply facility breakdown.

The response rate to pump failure was found to be slow even though about 28 percent (38 water users) of the water users said it took less than a week for the area mechanics to attend to their call. About 46 percent (63 water users) of the water users indicated that it normally takes a week for the area mechanic to respond to their call. This notwithstanding, the hand-pump communities were satisfied with the services of the area mechanics except that the charges for repairs were at times too high. It was only Siwarin-Daasa that had made preventive arrangements with the area mechanic in Sandema to visit their water

facility for routine maintenance every four months. The hand-pump community did not pay for this service.

Table 16: Rate of response to water supply facility failure

Duration (in weeks)	Frequency	Percentage
	(All Water Users)	
< 1	38	27.5
1	63	45.7
2	18	13.0
3	6	4.3
4	2	1.5
Pump has never broken down	11	8.0
Total	138	100.0

Note: n= 138

Source: Field Data, 2008

Bye-laws for water supply facility maintenance

The quest to ensure an efficient maintenance of a water supply facility presupposes the need for care to be taken in the use of the water supply facility to ensure its sustainability. This resulted in the enactment of bye-laws by the WATSAN committees to help safe guard the sustainability of the water supply facilities. The bye-laws varied from one hand-pump community to the other. However, common amongst all the hand-pump communities were laws on safe

usage of water supply facility, children below 10 years should not be allowed access to the water facility, no littering at pump site; avoid wasting water, and defaulters of tariff payment would be denied access to the water facility.

All the pump communities indicated that they had bye-laws governing the use of their water supply facilities. However even though these bye-laws were enforced in the various pump communities, the laws were not effective in practice. It was revealed that 75 percent (15 WATSAN members) of the WATSAN committees indicated that the bye-laws were not effective and hence did not serve their purpose. The remaining 25 percent (5 WATSAN members) affirmed that the laws were effective on the ground. Of the 75 percent that indicated that the laws were not effective, 6 members of the WATSAN committees said there was very limited supervision to ensure that water users abide by the laws. Further, 4 attributed it to the lack of education, while the remaining 5 members expressed both the fear of being attacked by culprits of the law, and the fact that community members were just being disobedient to the bye-laws.

Another revelation was that most of the pump communities could not punish culprits of the bye-laws on the ground of social solidarity. However, there were instances where some pump community members were prevented from fetching water from the boreholes because they failed to either pay tariffs or contribute financially to the repairs of the water supply facility. The resultant consequence was that some pump community members still used the traditional

unwholesome water sources such as streams, rivers, dams, open wells and dug out wells for diverse purposes.

Benefits from the provision of the water facilities

The provision of potable water in rural communities can result in health, economic and social benefits (Ntow, 1997). Improved water supply reduces infant mortality and increases the life expectancy of the rural inhabitants. All the water users indicated that the water supply facilities had improved upon their health status by eradicating guinea-worm, bilhazhea, and other water borne diseases in their communities. This has resulted in a significant benefit to the hand-pump communities since there is considerable savings in medical treatment, travel costs, income and time (Ntow 1997). Further, easier access to water can improve upon family and social development. Hence, women will spend less time in fetching water and therefore have more time for child care and income generating activities. This fact has been buttressed by the fact that 90 percent (124 water users) of the water users indicated that the provision of the water supply facilities have reduced the time spent in search of water and creating extra time for other economic activities. Further, 60 percent (83 water users) were of the view that the water facilities have encouraged teachers to accept postings to the pump communities and have also retained those who are already living and working there. Other benefits mentioned included continuous flow of water all year round and proximity to potable sources which hitherto was a problem. Thus, the availability of potable water supply in the pump communities have resulted in an

improved health, social, economic, political and to a larger extent development in the communities (SIWI, 2004-2005). Table 17 presents the distribution of benefits derived from the provision of the water facilities in the various hand-pump communities.

Table 17: Benefits derived from the provision of water supply facilities in the hand-pump communities

Benefits	Frequency	Percentage
Improved Health	138	100
Proximity to potable water	124	90
Continuous flow of water	138	100
Extra time for other activities	104	75
Attracted teachers and other public/civil servants	83	60

Note: n=138

Source: Field Data, 2008

Challenges encountered by the WATSAN committees

Once dealing with human beings in the various pump communities, the WATSAN committees in the various hand-pump communities were bound to encounter challenges in the discharge of their duties. It was found out that the

WATSAN committees were faced with a number of challenges in their quest to execute their day-to-day activities. The survey revealed that one major challenge confronting the WATSAN committees in the district was the unwillingness of hand-pump community members to make financial contributions any time there is the need to. Table 18 shows the challenges encountered by the 20 WATSAN committees surveyed.

Table 18: Problems encountered by WATSAN committees

Challenges	Frequency	Percentages
Lack of incentives	5	25.0
Defiance of bye-laws	2	10.0
Unwillingness to pay	7	35.0
Poor sanitation	3	15.0
Embezzlement	3	15.0
Total	20	100.0

Note: n=20

Source: Field Data, 2008

It was discovered that 35 percent (7 members) of the WATSAN committee members complained bitterly about the unwillingness of hand-pump community members to make financial contribution. This attitude served as a major setback in their work since the availability of funds formed the backbone of their work. Additionally, 25 percent (5 members) of the WATSAN committee members indicated their work lacked incentives. This is confirmed by the fact that

all the water users surveyed indicated that WATSAN committee members were not paid for their services. This had resulted occasionally in the embezzlement of funds by some committee members. It also explains the reason for the high attrition rates. About 15 percent of WATSAN members complained of embezzlement of maintenance and repairs funds. Finally, poor sanitation practices at the water facility site, and the non-enforcement of bye-laws accounted for 15 percent and 10 percent respectively.

CHAPTER SIX
INSTITUTIONAL AND HAND-PUMP COMMUNITY PARTICIPATION
IN MAINTENANCE OF WATER SUPPLY FACILITY

Introduction

The hand-pump community plays an integral role in ensuring a successful maintenance strategy or intervention. It is very difficult to achieve sustainability of a water supply project without full community participation. Given the right consultation and guidance, hand-pump community members can be motivated to help in the planning, construction and maintenance of a water supply project. This chapter describes both institutional and hand-pump community participation in managing the maintenance of the water supply facilities in the Builsa District. Thus, the following analysis looks at community participation, particularly the water users (women), opinion leaders and the Assembly Members in the planning, designing and construction of the water supply facilities.

Institutional participation

It is commonly known that where community management of a water supply facility is adopted, it is usually the result of a heavy donor input of expertise and resources. External assistance is best provided by local government institutions or NGOs or stakeholder groups. This may be in the form of a district

water and sanitation team including water, environmental health and community development staff (Harvey, 2005). For instance, CARE International reported that in December 1997, after a three-year period of mobilization and training, 97 percent of the 135 Afridev pumps in their project area were working and had an average down time of less than 10 days annually (Obiols and Baumann, 1998). It is therefore not surprising that with imported management and generous funding, maintenance can be improved.

It was against this background that the survey investigated the level of participation by the various institutions involved in the rural water sector in the Builsa district with regards to the provision and maintenance of the water supply facilities. Thus, the 138 water users were asked to provide the name of the agency or organization that provided their water supply facility. This is depicted by Table 19.

Table 19: Distribution of water supply facility providers

Agency	Frequency	Percentage
Central Government	78	56.5
District Assembly	16	11.6
N.G.Os	35	25.4
Community Effort	3	2.2
Don't Know	6	4.3
Total	138	100.0

Note: n=138

Source: Field Data, 2008

Note: Government of Ghana funding was from international donor agencies.

About 57 percent (78 water users) of the water users indicated that their water supply facilities were provided by the central government. However, 25 percent (35 water users) indicated that their water facilities were provided by NGOs, while 12 percent (16 water users) credited the District Assembly as providers of their water supply facilities. The commitment of the central government and the District Assembly to the provision of potable water supply in the rural communities was brought to light by the various responses. It is important to note that majority of the water supply facilities provided by the central government were under the sponsorship of international donor agencies such as CIDA, UNICEF, DANIDA, JICA, USAID and the EU among others. Further, the water supply facilities provided by the central government and the District Assembly were made available to the beneficiary hand-pump communities in accordance with the requirement of the CWSA that compelled communities to make an upfront contribution of five percent of the total cost of the facility. The package also included an aspect which entrusted the ownership and maintenance of the water facility to the beneficiary hand-pump communities. Finally, it was revealed that two percent of the respondents indicated that their water supply facilities were acquired by themselves and four percent did not know the providers of their water supply facilities. This group of respondents (four percent) indicated that the water supply facilities were installed by people unknown to them.

An integral aspect of the provision of potable water to rural communities is how to ensure a long term sustainability of the water supply facility. This can

only be achieved by means of the provision of expertise and other resources by the implementing agency to the beneficiary hand-pump communities to help augment their efforts at ensuring a long term sustainability of the water supply facility. Thus, the support the various institutions would render to the communities will go a long way to determine the effectiveness and success of the maintenance strategies put in place. The survey discovered that some of the hand-pump communities received some form of technical support from the District Water Sanitation Team (DWST) and the District Social and Community Development Works department. It was inquired from the water users the various forms of support they benefited from the institutions both within and outside the District and the responses are presented in Table 20.

Table 20: Forms of institutional support to pump communities

Type of support	Frequency	Percentage
Technical support	70	50.7
Financial support	14	10.1
None	43	31.2
Don't know	11	8.0
Total	138	100.0

Note: n= 138

Source: Field Data, 2008.

About 51 percent (70 water users) stated that their communities received technical support from the DWST. Thirty one percent (43 water users) indicated

that they did not receive any support, 10 percent (14 water users) said their communities had benefited financially from the District Assembly in support of their maintenance and repair strategies.

The technical support granted the hand-pump communities was basically on sanitation practices at pump site, education on proper usage and basic maintenance of the water supply facilities, and education on the appropriate ways of financial mobilization and management for pump maintenance and repairs. These visits to the hand-pump communities were carried out by the DWST. However, the visits were not regular and did not cover all the hand-pump communities due to some challenges faced by the DWST. This explains the reason why most water users did not even know of the services of the DWST to the hand-pump communities.

Hand-pump community participation

The beneficiary community of any rural water supply project plays a vital role in the operation and maintenance of the water supply facility. One of the main objectives of the NCWSP was to ensure maximum community participation in the planning, designing, installation and most importantly maintenance of the water supply facility through community ownership. Further, it is stated in the literature that community management of rural water supply facilities meant beneficiary communities had responsibility, authority and control over the planning, choice of technology, construction as well as the operation and maintenance of the facility (Laryea, 1994). Hand-pump community participation

in the planning, choice of technology and construction forms the main foundation for sustainable community water supply facility maintenance since the community would have a feeling of being part and parcel of the project. The survey examined the level of hand-pump community participation in the acquisition, planning, technology selection and maintenance of water supply facilities in the selected communities.

About 82 percent (113) of the water users said they made financial contributions towards the acquisition of their water supply facilities. On the average, these financial contributions ranged between GH¢ 3 to GH¢ 5 per adult male and GH¢1 to GH¢ 3 per female in all the pump communities. The financial contributions confirm the requirement by the CWSA that beneficiary communities should pay five percent of the total cost of the water supply facility before it is provided. However, 18 percent (25) of the water users said they had made no financial contribution towards the acquisition of their water supply facilities. Interestingly most of the hand-pump communities which did not contribute financially towards the acquisition of their water supply facilities benefited from the full sponsorship of NGOs and other donor agencies.

Hand-pump community participation in planning process

The planning stage of a rural water supply facility is very crucial especially where maintenance of the water facility is to be carried out by the community. The planning process comprised community sensitization on the following areas: community contribution of five percent of total cost of facility,

community ownership of the water supply facility, the need for the formation of a WATSAN committee to take care of day-to-day operation and maintenance of water facility. The sensitization also covered the need for community to adopt a financial mobilization method that will guarantee the availability of funds for maintenance and repairs. Communities were also made aware of the presence of area mechanics and a spare parts dealer in the district. Finally, the planning included education on the need for communities to open community bank accounts for safe keep of community funds meant for maintenance and repairs of their water supply facilities. Table 21 shows the distribution of the various responses with regards to community participation in the planning process.

It became evident that 56 percent (77 water users) of the water users expressed that they were involved in the planning of their water supply facilities. The involvement of community members in the planning process supports the assertion that a sense of ownership of the water supply facility amongst the community members would be developed and hence they would be motivated to take very good care of the facility. However, 31 percent (43 water users) said they were not involved in the planning process while 13 percent had no idea whether their communities were involved in the planning process or not.

Table 21: Hand-pump community participation in the planning process

Hand-Pump Community	Yes		No		Don't Know/Remember	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Akpiayeri- Guuta	5	3.6	11	8.0	2	1.4
Azugyeri	12	8.7	6	4.3	0	0
Dilogsa	7	5.1	3	2.2	1	0.7
Farinsa	5	3.6	6	4.3	1	0.7
Wiaga- Guuta	4	2.9	8	5.8	0	0.0
Longsa	7	5.1	5	3.6	2	1.4
Siwarin- Daasa	8	5.8	2	1.4	0	0
Tiendema	11	8.0	1	0.7	3	2.2
Wupiensa	9	6.5	0	0.0	5	3.6
Zundema	9	6.5	1	0.7	4	2.9
Total	77	55.8	43	31.2	18	13.0

Note: n=138

Source: Field Data, 2008

Hand-pump community participation in the choice of technology

Basically, there are two types of pumps that are commonly used in the Upper East Region, that is the "Afridev pump" and the "Nira pump". The survey sought to find out if beneficiary communities were given the opportunity to select from the two types of pumps. It was revealed that among the ten hand-pump communities, only Tiendema was allowed to choose the type of pump they most desired. Thus, 9 percent (12 water users) said they were involved in the choice of their pump technology (Table 22). However, about 72 percent (99 water users) said they did not participate in the choice of their pump technology, while 19.6 percent (27 water users) had no idea as to whether their communities participated in the selection process or not. This confirms the literature that rural water supply facilities were provided without involving the beneficiary communities in planning and choice of technology (Kendie, 1994).

The result from Table 21 revealed that the water supply facilities were provided to the pump communities by the project implementers without involving the users in the choice of the technology. This had serious maintenance implications since it contradicts with one of the main requirements of community management of water supply facilities; that the beneficiary community has the legitimate right to make decisions about the choice of technology and service levels of their water supply facility (Kwashie, 2007).

Table 22: Hand-pump community participation in the choice of pump technology

Hand-pump Community	Yes		No		Don't Know/Remember	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	Akpiayeri- Guuta	1	0.7	13	9.4	4
Azugyeri	1	0.7	16	11.6	1	0.7
Dilogsa	1	0.7	7	5.1	3	2.2
Farinsa	0	0.0	11	8.0	1	0.7
Wiaga- Guuta	0	0.0	12	8.7	0	0
Longsa	0	0.0	12	8.7	2	1.4
Siwarin- Daasa	0	0.0	10	7.2	0	0.0
Tiendema	8	5.8	4	2.9	3	2.2
Wupiensa	1	0.7	7	5.1	6	4.3
Zundema	0	0.0	7	5.1	7	5.1
Total	12	8.7	99	71.7	27	19.6

Note: n= 138

Source: Field Data, 2008

For instance, results from the focus group discussions revealed that hand-pump communities preferred the Afridev pump to the Nira pump on the following grounds: that the Afridev pump is more durable, last longer and is user friendly; and that the spare parts for the Afridev pump are relatively cheaper and less scarce compared to the Nira pump. It was therefore clear that the Afridev pump was cheaper to maintain compared to the Nira pump. This development partly explained the high pump failure rate and the inefficient performance of most of the water supply facilities in the pump communities.

Hand-pump community participation in the installation process

Pump community participation during the installation of the water supply facility helps makes the community members feel part of the project, thus motivating them to take proper care of the water supply facility. It was brought to light that pump community participation during the installation of the water supply facilities was at its maximum as 96 percent (132 water users) of the water users provided labour while 69 percent (95 water users) made material donations to staff of the construction firm that carried out the installations. The distribution of pump community participation during the installation stage is displayed in Table 23.

Table 23: Hand-pump community participation during pump installation

Pump Community	Provision of Labour		Material Contribution		Feeding of Staff	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	Akpiayeri- Guuta	17	12.3	16	11.6	4
Azugyeri	18	13.0	15	10.9	7	5.1
Dilogsa	11	8.0	6	4.3	2	1.4
Farinsa	13	8.7	8	5.8	0	0
Wiaga- Guuta	10	7.2	5	3.6	1	0.7
Longsa	14	10.1	7	5.1	4	2.9
Siwarin- Daasa	10	7.2	7	5.1	4	2.9
Tiendema	15	10.9	10	7.2	3	2.2
Wupiensa	12	8.7	12	8.7	5	3.6
Zundema	13	9.4	9	6.5	5	3.6
Total	132	95.6	95	68.8	35	25.3

Note: n=138

Source: Field Data, 2008

The commonest mode of pump community participation during the installation of the water supply facilities was the provision of unskilled labour by the beneficiary communities. Labour was in the form of clearing of site for

hydrological and geological surveys, carrying of installation pipes and other materials to and from the site. Labour was provided by both males and females but in most cases it was the duty of the males to provide labour during the installation. Donations were in the form of fowls, goats, and sheep. About 25 percent (35) of the respondents said they provided some sort of feeding to construction staff.

In sum, hand-pump community participation in the planning, designing, and choice of technology was very limited as indicated previously. This had a negative impact on the overall maintenance of the water supply facilities in the various hand-pump communities since there was involvement of communities in the very essential parts of the water projects.

Women participation in pump maintenance

In Ghana, traditionally, women and children are the primary collectors, users, and managers of household water. When water systems break down women and children are the most affected, since they then have to travel far to search for water for household use. Women are the key players in implementing changes in hygiene behaviour; however, despite the knowledge and experience that they bring to water resource management, the contribution and roles of rural women are often overlooked or under-utilized in the drafting of water and sanitation policies. Cleaver and Kaare (1998) observe that water projects tend to emphasize women's natural roles by involving them in activities that make them more efficient in the performance of these roles.

However, even though women in the study communities were not involved in the planning process of water supply facilities, they played a very important role in the construction and maintenance of water supply facilities in the various pump communities surveyed.

Women in the pump communities provided labour as in carrying construction materials during the installation stage of the facility. They provided water and cooked food for construction staff.

Women were made pump caretakers in all the WATSAN committees in the various pump communities. They ensured the day to day maintenance of the water supply facilities. The women representatives (80%) disclosed that they organized, on routine base, clean-up and clearing of weeds around their water supply facilities. These exercises were targeted at ensuring safe water sanitation practices at pump site. Throwing more light on the exercise, the women representatives said the clean-up exercise was planned among the women in the various households under the supervision of the women representatives in the various pump communities. However, during the rainy season, the representatives organized communal labour to clear weeds around the water supply facilities. Cleaning the surroundings of the water facility was done on a daily bases as disclosed by five (62.5%) of the women representatives. Additionally, the remaining three (37.5%) women representatives said they carried out cleaning exercises on weekly bases. Interestingly, two (20%) of the women representatives said their communities had stopped the routine clean-up exercises due to a misunderstanding between the women in one instance and non compliance with

the rotation system of cleaning the water facility surroundings amongst the women in the pump community.

Finally, the women in the various pump communities served as watch dogs at pump sites to ensure that children do not misuse the water supply facilities or waste water. Thus, women participation in the various water projects was very effective and commendable.

Hand-pump community willingness to pay for pump maintenance

The willingness to pay (WTP) in this context is about how much water users in the various hand-pump communities are willing to pay in contribution towards the maintenance and repairs of the water supply facility. While concentrating on the WTP, attention must also be given to the ability of water users to pay, for willingness to pay in the absence of ability to pay is tantamount to unwillingness to pay. The WATSAN committees revealed that a major setback in their work was the unwillingness of water users to pay either the tariffs or make contributions towards repairs and maintenance of the water supply facilities. Out of the 20 WATSAN committee members surveyed, 17 (85 %) of them lamented that community members were not willing to pay either scheduled levies or make contributions as and when needed for pump repairs and maintenance on the grounds that they did not have money to pay. This explains why about 65 percent of the hand-pump communities adopted the system of making financial contributions only when the water supply facility is faulty or broken down.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The study was aimed at assessing the management of the maintenance of rural water supply facilities in the Builsa District. Specifically, it focused on the capacity of the institutions involved in the maintenance of rural water supply facilities, the level of hand-pump community participation in the management of water supply facilities, and the funding systems for water facility maintenance. Based on these objectives, a number of research questions were posed and the summary and conclusions derived from the findings are presented below.

Summary

The first objective of the study was to assess the capacity of the institutions involved in the maintenance of rural water supply facilities in the Builsa District. This covered the maintenance structure of the Builsa Rural Water Project which begins with the DWST, area mechanics, the spare parts dealer, and the WATSAN committees.

DWST

- The DWST had staff strength of ten professionals who are well-qualified and experienced. The team received funding support from the District Assembly, CWSA and donor agencies. They also go for refresher training.
- The team had three office spaces, computers (6 desk tops and 2 lap tops), a modest quantity of equipment, and three motorbikes.
- The DWST enjoyed massive support from the WATSAN committees, community elders and area mechanics.
- The team rendered technical support to all hand-pump communities in the district. The technical support included training of WATSAN committees, education on water sanitation, and how to manage the water supply facilities.
- The DWST lacked sufficient funding, logistical support and incentive to carry out their duties effectively. Cumbersome procedures by the District Assemblies on proposals and payment of budget allocations affected their work. The three motorbikes (two currently broken down) allocated the team was woefully inadequate for the entire district. The team did not also have a laboratory for water analysis.
- There was also a high level of political interference and party politics amongst staff. Official time and resources were used for political activities.

- Refresher training had not been organized for staff for the past two years.
- The team also complained of the disinterest of Assembly Members in water issues at the hand-pump community level.
- Training of WATSAN committees was transferred from the DWST to the private firms contracted to drill and install the water supply facilities. WATSAN committees either received inadequate training or were never trained since the private firms took over the training.

Area mechanics

- The attrition rate of area mechanics was very high. Two out of the four area mechanics had resigned at the time of the survey.
- There was an increase in repair activities over the years from about 69 in 2006 to about 113 in 2007. On the average each of the area mechanics conducted 35 repairs in 2006 and 57 repairs in 2007 with an average increase in repairs of 39 percent.
- As the number of repairs increased, the charge per repair for hand-pump communities increased in accordance with the distance of the community from the area mechanic's shop.
- The average yearly maintenance cost for tools was GH¢ 15.00. Additionally, the average annual income per area mechanic was GH¢ 1567.50. The monthly income of GH¢ 130.60 was not encouraging.

- The area mechanics enjoyed a cordial relationship with the WATSAN committees and spare parts dealer, except for the cases of price hikes of spare parts.
- The area mechanics did not have motorbikes to carry out their duties, and hence had to either rent or borrow motorbikes in order to travel to distant hand-pump communities. This affected the rate of response to pump breakdowns.
- Bad roads linking the hand-pump communities made accessibility to the communities difficult for the area mechanics in the event of a pump breakdown. The situation was particularly worse in the rainy season where some pump communities were completely cut off.

Spare parts dealer

- The entire Builsa District had only one spare parts dealer. The dealer's shop was originally used for the sale of used bicycles until he was supported by the CWSA to start or include the sale of spare parts.
- The spare parts dealer had his supplies from both the CWSA and Water Vision Technology (WVT) at subsidized prices.
- There was a scarcity of some spare parts in the district and the region, hence the spare parts dealer had to travel to Tamale, Kumasi or Accra to buy these parts.

- Total sale of spare parts had increased over the years. For instance, total sales for 2006 were GH¢ 510.00, while that of 2007 was GH¢ 647.20.
- The prices of spare parts were also on the ascendancy over the years due to scarcity of the parts.

Water and sanitation (WATSAN) committees

- The selection of WATSAN committee members was made by the community on the bases of proximity to the water supply facility. The committees were generally gender balanced.
- The attrition rate of WATSAN members was on the ascendancy. The commonest excuse for leaving was that the job was not economically rewarding. The attrition was more frequent for males than females due to family pressure on men to take care of bills.
- The replacement rate was higher for males (78%) than females (22%). But the general replacement rate of WATSAN members was very slow; about 65 percent of the vacancies had not been replaced at the time of the survey.
- Women were more stable than their male counterparts in the WATSAN committees, due to marriages, care for children and the importance they (women) attached to potable water.

- At the time of the survey, eight (30.8%) of the water supply facilities were broken down, ten (38.5%) were not functioning as efficient as they should and the remaining eight (30.8%) were in very good shape.
- The reasons for the breakdowns was mostly (44.4%) due to worn-out T-bars (for Nira pumps). Other reasons found to be responsible for the breakdowns were the ineffectiveness of the WATSAN members to manage the water facilities, excessive pressure of the water facilities, misuse of the water facilities by the communities, particularly children. The duration for water supply facility breakdown ranged between one week and five months.
- The WATSAN committees complained of a scarcity of spare parts in the district and this partly contributed to the delay in the repair of faulty water supply facilities.
- About 44 percent of the WATSAN committees called on the area mechanic twice a year, while 43 percent called on the area mechanics three or more times in a year, while the remaining WATSAN committees called on the area mechanics once a year. These calls were mostly in the dry season.
- WATSAN committee members complained of the unwillingness of community members to pay tariffs or make contributions any time their water supply facilities break down. There was also unwillingness of the community to clean the surrounding of the water supply facilities regularly.

- Almost all of the communities had bye-laws which were enforced but were not effective mostly because of the lack of supervision to ensure the full enforcement of the bye-law (50%). There was also the lack of education (28.6%), and attack from culprits (14.3%).
- The provision of the water supply facilities in the communities had brought about social, economic, health, political and to a large extent community development to the people.

The second objective was to determine the level of community involvement, especially women in the process of managing the maintenance of the water supply facilities.

Community participation

- Almost all the pump communities (82%) made financial contributions towards the acquisition of their water supply facilities. Contributions ranged between GH¢ 1 and GH¢ 5 per adult.
- About 56 percent of the pump communities were involved in the planning process, while 31 percent were not involved in the planning. The remaining 13 percent had no idea.
- About 72 percent of the respondent said they were not involved in the choice of pump technology. They were not given the opportunity to choose the pump technology they most desired. Hence, most of the pump communities expressed dissatisfaction with the type of pump technology they had.

- All the pump communities provided labour in the form of clearing pump site, carrying installation pipes, sand, stones, and cement to the pump site during the drilling or digging and installation stages.
- The majority of the pump communities (69%) made material donations in the form of fowls, goats, and sheep to the staff of the construction firm.

Participation of women in maintenance of water supply facilities

- Women also made financial contribution towards the acquisition of their water supply facilities. An average amount of between GH¢ 1 and GH¢ 3 per female adult.
- Almost all the women (90%) were not included in the planning process of their water supply facilities. Women were also excluded in the choice of the pump technology.
- The exclusion of women was attributed to traditional or customary norms.
- However, women provided labour during the construction of their water supply facilities. Women groups also made material donations to staff of the construction firm as a supplementary to the community donation.
- Women organized routine clean-up exercises at pump site to ensure sanitation at the surroundings of the water supply facilities. They also cleared weeds around the water facility during the rainy season.

- The women also served as watch dogs at pump site to ensure that children do not misuse the water supply facilities or waste the water.

The third objective was to assess the willingness of community members to pay towards the maintenance of their water supply facilities.

- Members of the various hand-pump communities complained of the scarcity of funds and hence their unwillingness to pay tariffs or make contributions towards pump maintenance and repairs.
- There was also the issue of embezzlement by WATSAN treasurers which discouraged some community members from paying tariffs.
- Water users in some communities were also not willing to clean the surrounding of the water supply facilities regularly.

The fourth and final objective of the study was to examine the funding system as it pertains to the maintenance of the water supply facilities.

- All the hand-pump communities either practised the tariff system (35%, 48 water users) of financial mobilization or made contributions (65%, 90 water users) when their water facility breaks down.
- About 70 percent (96 water users) said they saved their community funds for pump repairs and maintenance with the WATSAN treasurer or chairman instead of a community bank account. The remaining 30 percent (42 water users) said their pump maintenance and repair contributions were saved in a community bank account.
- Poor financial mobilization and management did not guarantee readily available funds for pump maintenance and repairs. The total amount

available for the maintenance of the 26 water supply facilities in all the 10 surveyed hand-pump communities was GH¢ 330. Thus, the amount per pump was GH¢ 12.7 which was not sufficient for major repairs.

Conclusions and policy implications for managing the maintenance of rural water supply facilities in the Builsa District

Apart from the fact the inadequate funds, logistical constraints and political interferences, which serve as a threat for future maintenance of the water supply facilities, they also serve as a disincentive for the DWST to carry out their roles and responsibilities in the district. This may lead to a major failure in the project. The continued involvement of the District Assemblies, the WATSAN committees, the area mechanics, and the spare parts dealer will auger well for the future maintenance of the water supply facilities in the district.

The unavailability of motorbikes at the disposal of the area mechanics has made it difficult for them to carry out their work effectively. The area mechanics are forced to rent motorbikes at a high cost or join public transports. The implications are that if the area mechanics do not charge fees to cover the high costs of transportation or do not get any form of support to buy motorbikes, they may abandon the repair work to engage in other more rewarding economic activities as was in the case of the earlier resignations. The communities will ultimately lose the services of the remaining two area mechanics in the district if the issue of transportation is not addressed.

The scarcity of spare parts in the district must be addressed immediately in order to guarantee the availability of spare parts for pump maintenance and repairs. The scarcity of these spare parts has resulted in mistrust between the area mechanics and the WATSAN committees. This can only be solved if there is a regular supply of spare parts in the district. Furthermore, the price hikes of spare parts pose a great danger to the maintenance of the water supply facilities since there will come a time that hand-pump communities will not be able to afford the prices of these spare parts. Thus, the sustainability of the water supply facilities will be a failure if the District Assembly and the CWSA do not find a lasting solution to the scarcity of spare parts and the continuous price hike of these parts. The success or failure of the water projects is dependent on the ability of the District Assembly and the CWSA to stock the spare parts dealers' shop with sufficient parts at subsidized price rates affordable to all hand-pump communities.

The relatively stable nature of the WATSAN committees is an opportunity to improve the management of the water supply facilities in the future. However, given the frequency with which the members leave the committee due to lack of motivation and death, it would be necessary for the paramount chief, community leaders, the District Assembly and CWSA to institute measures that would make the work more attractive.

The failure on the part of the community leaders and WATSAN committee members to ensure the effective enforcement of the bye-laws has a number of maintenance implications. These include the misuse of the water supply facilities by children, and poor sanitation at pump site especially where

there is no supervision to ensure that users abide by the bye-laws. Additionally, defaulters of the bye-laws who go unpunished discourage the WATSAN committee members from effectively managing the water supply facilities. In the long run, there may be no WATSAN committee and gains to be derived from the water supply facilities may not be achieved.

Further, the stability of women in the WATSAN committees is an indication that they are more concerned about the use and management of the water supply facilities. This implies the problems that prevent them from actively participating in the planning and choice of pump technology of the water project need be addressed. Thus, the participation of communities in the water project (planning and choice of technology) and the sense of ownership will motivate them to contribute and take good care of the water supply facilities.

The unwillingness of hand-pump community members to pay towards pump repairs and maintenance has been a major setback at the efforts put in place to ensure sustainability of the water supply facilities. The issue of willingness to pay and ability to pay must be considered seriously in the context of the hand-pump communities. It is very clear that the unwillingness to pay have serious maintenance implications since WATSAN committees will not be able raise enough money on time to repair faulty water supply facilities let alone carrying out routine maintenance. This situation is very alarming and needs to be addressed urgently.

The system of making contributions when the water supply facility breaks down has serious implications for the maintenance of the water supply facility.

There is the tendency of people not being able to pay the amount allocated them since the division is based on the charge of the area mechanic and in some cases the price(s) of the faulty part(s). These bills are usually high and require a short period for payment to be done in order for repairs of the water facility to take place. The attitude of “go and come” will be the order of the day, and thus will not encourage the WATSAN treasurer or chairman to continue their operation. The resultant consequence will be a delay for repairs to be carried out.

Saving community funds with the WATSAN treasurer or chairman was not the safest and efficient means of financial management. There was always the tendency of financial misappropriation on the part of whoever is put in charge of keeping the funds. Some community members were discouraged from paying annual tariffs since there was always the fear that their contributions would be misappropriated by the WATSAN committee members. This development had serious maintenance implications especially where funds meant for pump repairs and maintenance are misappropriated by the WATSAN treasurer. The immediate effect was the lack of funds for maintenance or repairs when the need arises.

Recommendations

The following recommendations were made based on the conclusions to aid manage the maintenance of rural water supply facilities in the Builsa district and elsewhere.

DWST

- The duties and responsibilities of the DWST will be effectively carried if the District Assembly and for that matter Government provides the team with the requisite financial and logistical support. The budgetary allocation to the DWST should be adequate to cover all its office and field expenses. The District Assembly and the CWSA should increase the number of motor bikes allocated to the DWST and also provide the team with one or two four-wheel drive pick-ups to enable them travel to the distant communities in the district.
- An M&E system must be put in place by the CWSA that will ensure that vehicles and motorbikes are used for only official errands.
- A laboratory for water analysis should be established by Government in the District to facilitate prompt water analysis to be carried out.
- The salary structure of the team must be reviewed by Government to an appreciable level. This will serve as a motivation to staff and hence encourage them to work harder. The eight years arrears in allowances of field officers must be paid to them and a system of prompt payment of allowances be instituted.
- Political interference in the activities of the DWST should be discouraged. The CWSA should put in place stringent measures that will deter staff of the DWST from engaging in political activities.
- The CWSA should also step up its supervision of the DWST to put them on their toes, in order for the district to derive the maximum

benefit from them. Regular refresher training should be organized for staff of the DWST, particularly the field officers to keep them abreast with current maintenance techniques.

Area mechanics

- The increasing charges of the area mechanics are as a result of the high cost of transportation and the maintenance cost of their tools. To safeguard against future break down of the water supply facilities, the District Assembly or CWSA or both should provide area mechanics with motorbikes either free of charge or at a subsidized cost. Further, tools for the area mechanics should be provided by the CWSA at subsidized rates. By this, the area mechanics will not have any excuses for charging high rates.
- WATSAN committees should ensure prompt payment of the area mechanics for work done to enable the area mechanics stay in business. This can be achieved if the DWST organize sensitization programmes to educate the WATSAN committees on the importance of prompt payment of the area mechanics.
- Refresher training should be organized by the CWSA on regular bases for the area mechanics to keep them abreast with modern pump technologies and techniques of pump repairs.

Spare parts dealer

- The scarcity of spare parts in the district can be addressed if the District Assembly sets up a warehouse in the district so that it can make bulk purchase or importation of spare parts and in turn sell to the spare parts dealer. The advantage of this system is that the purchasing power of the District Assembly will be more effective and stronger than the WVT. Further, the District Assembly has a much stronger financial base through the district common fund to make such purchases.
- The high annual increases in the prices of spare parts and scarcity can be resolved if the national CWSA encourages and equips the local manufacturers to produce the parts locally.
- The CWSA need to help increase the number of spare parts distributors in the upper east region to help reduce the pressure on WVT which is currently the sole distributor of spare parts in the region. This will provide spare parts dealers in the region alternative sources of spare parts.

WATSAN committees

- It is recommended that the number of water supply facilities in communities with insufficient water supply facilities be increased in order to decrease the pressure on the existing ones. This will further reduce breakdown rates particularly in the long dry season.

- To improve the work of the WATSAN committees, a legal instrument should be prepared by the DWST and endorsed by the District Assembly. The legal instrument should give a clear decree on how vacancies should be filled, a number of standard bye-laws with room for additions, and motivational packages for WATSAN committee members. This will give WATSAN committees the political backing to safeguard against the future mismanagement of the water supply facilities. The legal instrument should also spell out fines for breach of any of the provisions. Most importantly, the legal instrument should not be imposed on community members by the community leaders but rather the entire community should be prepared and ready to accept it. By so doing, the implications of this directive will be understood by the community members to ensure effective management and maintenance of the water supply facilities in the long run.
- With regards to the maintenance of the water supply facilities, the communities should make arrangement with the area mechanics for regular preventive visits and training of pump care takers. This exercise will enable the area mechanic detect any small fault early to avoid it developing into a major fault.

Community involvement

- It is essential for the CWSA to appraise the role of the community leaders and opinion leaders in the development and maintenance of

rural water supply facilities in more definitive terms. This can be achieved through capacity building including awareness creation and sensitization to enable them play the key role of resolving and managing conflicts including those related to water facility maintenance. It will also foster linkage and co-ordination within the traditional structures that are responsible for managing the maintenance of water supply facilities.

- Communities tend to value their water supply facilities, make better use of the facilities and operate and maintain them more efficiently when they have contributed resources. In the planning, choice of technology and construction stages of a rural water project, the communities should be engaged effectively with a significant representation of women, particularly in the choice of the pump technology. This will stimulate the principle of ownership amongst the rural population.

Women participation in water facility maintenance

- Women have the responsibility of obtaining water for domestic use. Planners in the past have mostly been men, and in many communities, religious and cultural beliefs make it virtually impossible for the views of women to be accepted by male planners. Thus, planning must, therefore, make full use of women for social research and investigation into their water needs. Their composition in the WATSAN committees

should be greater than or equal to the males and they should be made to hold the key management positions within the committees.

- In the design and construction of the rural water supply facility, technology should be kept as simple as possible so that local women and all other users of the facility will be able to operate and maintain the water supply facility for a longer period of time. Thus, women should form an integral part of the choice of pump technology to use.

Funding system and management of funds

- All communities in the district should be encouraged to make annual tariff payments or contributions towards the maintenance and repairs of their water supply facilities. This will guarantee the regular availability of funds for both maintenance and repairs. Further, defaulters of the tariff system should not be allowed access to the water facility. This can be achieved by locking the water supply facility regularly.
- Communities should also be encouraged to open bank accounts with the Builsa rural bank for the safe keeping of their annual contributions. However, signatories to the account should be the community leader and the WATSAN chairman. This system will help get rid of financial misappropriation on the part of WATSAN committee members. This will also assure community members that their contributions are in

safe keeps and hence motivate them to contribute effectively towards the maintenance of the water supply facility.

Willingness to pay (WTP)

- It is recommended that more jobs be created in the district by both Government and nongovernmental organizations to absorb the unemployed youth in the District. This will help improve their financial situation and put them in a much better position to make contributions towards pump repairs and maintenance.
- Hand-pump communities should also be educated by the DWST on the importance of making financial contributions towards the maintenance of their water supply facilities.
- In the meantime due to the high poverty rate in the pump communities, it is strongly recommended that the Government, NGOs, and donor agencies come to the aid of the hand-pump communities with seed money for pump maintenance.

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Appendix A

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

QUESTIONNAIRE FOR BUILSA DISTRICT DWSMT

Dear respondent,

This questionnaire schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you take a little time off your busy schedule to answer these few questions?

Kindly be candid in your responses.

Thank you.

To be completed by respondent

Date and time of filling the questionnaire:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

Section I: BACKGROUND INFORMATION

1. District:..... Agency:.....
2. Position in team:.....
3. What is your major responsibility(s) in the team? Please list them below.....
.....

Section II: MAINTENANCE SYSTEM FOR WATER FACILITIES

4. How many water supply facilities are in the district?
 - (i) Bore holes:.....
 - (ii) Well fitted with hand-pump:.....
5. Are all these water supply facilities functioning currently?

- (i) Yes [] (ii) No []

If No, what is the problem with the faulty pumps?.....

.....

6. Who is responsible for managing the facilities in the various communities?

- (i) WATSAN committee (care takers)/Community []
- (ii) District assembly []
- (iii) GWSC/CWSD/DWMT []
- (iv) Area mechanic []
- (v) Other, [], specify:.....

7. Does the team offer any support either financially or technical advice in relation to maintaining the water facilities?

- (i) Yes [] (ii) No []

If yes, please specify the kind of help you offer:.....

8. Do you have field officers who periodically visit the various water facilities in the district?

- (i) Yes [] (ii) No []

If yes, what exactly do they do when they visit the hand-pump communities?.....

9. Do you organize refresher courses for area mechanics?

- (i) Yes [] (ii) No []

If No, please give reason(s):.....

10. What institutional/organizational backing do you have?

.....

11. How helpful have they been in providing some requisite support?

- (i) Financial
- (ii) Technical
- (iii) Material
- (iv) Moral

12. What is the structure of the management system you have in place for the maintenance of water supply facilities in the district?

.....

13. a. How does the structure work?

.....

13b. Can the current maintenance structure put in place ensure long term sustainability of the water project? (i). Yes (ii). No

13c. If no why:

.....

13d. If yes give reasons:

.....

14. What are your roles and responsibilities in managing the maintenance of rural water supplies in the district?.....

Section III: CAPACITY OF THE DWSMT

(Please tick where appropriate)

15. a. What has been your strength in performing these roles?

.....

15b. Experiences that you would like to share:.....

15c. what has been your weakness in performing these roles?

15d. What are some of the problems you encounter in the process of carrying out your duties?

.....

15e. When you encounter problems, how do you resolve them?

16. Which of the following serve as threat in performing your roles and responsibilities?

- (i) Legal and regulatory framework
- (ii) Social norms and values
- (iii) Cultural practices
- (iv) Political interference
- (v) Financial constraints (s)

(vi) Other specify;

.....

17. Do you have enough staff members to help in the dispatch of your duties?

(i) Yes [] (ii) No []

If No, why?.....

18. How many field officers do you have in the agency?.....

19. Are employees of the agency in the district well motivated in the pursuance of their duties?

(i) Yes [] (ii) No

Please give a reason for any choice of response:.....

20. Do members of the team go for refresher courses?

(i) Yes [] (ii) No []

If No why?.....

21. Does the agency have enough logistics to perform its duties?

(i) Yes [] (ii) No []

22. How many of the following do you have in the agency?

(i) Vehicle,specify type:.....

(ii) Motorbike:.....

(iii) Bicycle:.....

23. Are all these facilities currently in good shape?

(i) Yes [] (ii) No []

If No, why?.....

24. What recommendation (s) would you suggest for improving?

(i) Your performance

.....

(ii) The

maintenance.....

Appendix B

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

INTERVIEW SCHEDULE FOR WATSAN COMMITTEE MEMBER

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

a) **Name of interviewer:**.....

Section I: BACKGROUND INFORMATION

(Tick where applicable)

1a. Name of Village

1b. Name of Community

1c. Occupation in wet season:

- | | | | |
|-------------|--------------------------|----------------------|--------------------------|
| i Farming | <input type="checkbox"/> | ii Trader | <input type="checkbox"/> |
| iii Artisan | <input type="checkbox"/> | iv Formal activities | <input type="checkbox"/> |

v Other , specify:.....

1d. Occupation in dry season:

- i Farming
- ii Trader
- iii Artisan
- iv Formal activities
- v Other, specify:.....

Section II: WATER FACILITIES IN COMMUNITY

(Tick where applicable)

2a. What are the main water supply facilities in your community?

- i. Bore holes
- ii. Wells fitted with hand-pump
- iii. Open well
- iv. Surface water (river, dam, stream, pond etc)
- v. Water into dwelling
- vi. Piped water into yard/plot/compound

2b. If borehole and well fitted with hand-pump, indicate the following:

- i. Number of boreholes:
- Number of wells fitted with hand-pumps:

2c. when was the first water supply facility or pump installed in your community?

.....

2d. How many of these facilities are presently working?.....

3a. If broken down, indicate the duration of breakdowns in;

Days Weeks Months Year's

3b. Reasons for breakdown

3c. Which period do you mostly experience pump breakdown most?

- i. Dry seasons
- ii. Wet seasons
- iii. Other, specify

4. Who are in charge of the daily maintenance of the water supply facilities or pumps?

- i. WATSAN committee (care takers)

- ii. Unit committee
- iii. District assembly
- iv. N. G.O
- v. Individual
- vi. Other, specify

5a. If WATSAN committee, how were members of committee selected

.....

5b. Who is in charge of appointing WATSAN committee members in the district?

- i. Community members
- ii. District assembly
- iii. N. G.O
- iv. Individual
- v. CWSA/DWMT
- vi. Other, ,specify:

5c. How many members are in the WATSAN committee?

- i. Male
- ii. Female.....

6a. Do members of committee receive any form of salary? i. Yes ii. No

6b. Has any member (s) of the committee left since its formation?

- i. Yes ii. No

If yes, why did those who left do so?

Section III: FINANCING OF MAINTENANCE,

(Ticks where applicable)

7a. How do you finance the maintenance of the water supply facilities in your community?

- i. Levies Go to 7g
- ii. Sale of water Go to 7C
-

- iii. Finds from D. A Go to 8
- iv. Funding by N.G.O Go to 8
- v. Funding by individual Go to 8
- vi. Other, specifyGo to 8

7b. Is this system currently in operation

- i. Yes
- ii. No

(if sale of water, answer question 7c – 7g)

7c.

	Sale Since	PRICE OF WATER IN CEDIS			AMOUNT CURRENTLY AVAILABLE TO COMMUNITY	
		18 L Bucket	36L Bucket/Basin	50L Bucket/basin/ gallon	CASH BOX	BANK
Amounts						

7d. How do you rate the price of water?

- i. Expensive
- ii. Moderate
- iii. Affordable

7e. Is it only those who can afford to buy who use water

- i. Yes
- ii. No

Explain;.....

7f. What do they use the water for?

- i. Cooking
- ii. Bathing
- iii. Washing
- iv. Drinking
- v. Other, specify;

7g. What is the mode of charging households or individuals the levy

- i. Per week
- ii. Per month
- iii. Per quarter
- iv. Six months
- v. Per year

7h. Are community members willing to pay? i. Yes ii. No

7i. How much does each household or person contribute based on the mode of levying adopted?.....

7j. Who is in charge of or responsible for collecting the levies?

7k. How much does the community earn in a year?

7l. How do the community manage or save the funds?

8a. Do you encounter any problem(s) with this system of funding?

- i. Yes
- ii. No

8b. If yes, please list the problem(s):.....

8c. Why did you adopt this particular method to other?.....

9a. Do people from nearby village come to fetch water from your borehole?

- i. Yes
- ii. No

9b. If yes what is their contribution towards the maintenance of the borehole?

.....

9c. Has there ever been any conflict between the local people and others from outside?

- i. Yes
- ii. No

9d. If yes what is the nature of conflict?

.....

9e. If no what is the general attitude of the local people to such "intruders"

- i. Hostile
- ii. Indifferent
- iii. Cooperative

10a. Do you buy spare parts?

- i. Yes
- ii. No

10b. If yes, how many purchases of spare parts have you made since 2000?

- i. Less than 3 purchases
- ii. 3-4 purchases
- iii. 5-6 purchases
- iv. 7-8 purchases

10c. What is the highest price paid for spare parts bought since the pump was installed?

- i. ₦10,000-₦50,000
- ii. ₦51, 000-₦100,000
- iii. ₦101,000-₦150,000
- iv. ₦151,000-₦200,00
- v. Above ₦25,000

11a. Do you buy spare parts from the spare parts dealers?

- i. Yes
- ii. No

11b. If yes indicate distance from spare parts dealer :.....(km)

11c. Do you encounter problems dealing with the spare parts dealers?

- i. Yes
- ii. No

11d. If yes, how can the problem (s) be solved?

.....

12a. How often do you call the pump repairman?

- i. Once year
- ii. Twice a year
- iii. Thrice a year
- iv. More than 3 times a year

12b. What is the waiting period between report of pump failure and his attendance to repair pump?.....

12c. During the waiting period what is your source of water supply

- i. Dug out
- ii. River/stream
- iii. Well
- iv. Cemented well
- v. Pond
- vi. Other
- vii. ,specify:

12d. Do you have any preventive visit arrangements with the area mechanics?

- i. Yes
 - ii. No
- If yes what is the arrangement?

13. What is the average charge per repair?

- i. Below ₪10,000
- ii. ₪10,000-₪20,00
- iii. ₪21,000-₪30,000
- iv. ₪31,000-₪40,000

14. Do you encounter problem (s) dealing with the repairmen?

- i. Yes
 - ii. No
- If yes list problem;

.....

15a. Do some of the community members still draw water from the traditional source (s)

- i. Yes
- ii. No

If yes, which type of source(s)?

- i. Dug out
- ii. Surface water (River, stream, pond, etc.)
- iii. Well
- iv. Other , specify:

15b. For which purpose do they use the water for?

- i. Bathing
- ii. Cooking
- iii. Washing
- iv. Drinking
- v. Other specify

15c. Why do they still use the traditional source (s)?

- i. Proximity
- ii. Overcrowding at the pump
- iii. Tradition
- iv. Taste
- v. Lack of funds
- vi. Pump broken down
- vii. Other specify:

16. In your view what is the percentage of people using the traditional source?
.....

17. Has your community benefited in any way from the water supply facilities?

- i. Yes
- ii. No

If yes, list the benefits

If no, give reasons

18. Do you bye have laws related to the water point?

- i. Yes
- ii. No

Are these bye laws currently functioning?

- i. Yes
- ii. No

If no, what is the reason for its ineffectiveness?

19. Do you encounter problem(s) dealing with the community?

- i. Yes
- ii. No

If yes list the problem(s)

20. In your opinion how can the problem (s) be solved?.....

Appendix C

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

INTERVIEW SCHEDULE FOR WOMEN REPRESENTATIVE

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

b) **Name of interviewer:**.....

Section I: BACKGROUND INFORMATION

1. Village:..... Community:.....

2a. Occupation in wet season:

(i) Farming []

(ii) Trader []

(iii) Artisan []

(iv) Formal activities []

(v) Other [], specify:.....

2b. Occupation in the dry season:

- (i) Farming []
- (ii) Trader []
- (iii) Artisan []
- (iv) Formal activities []
- (v) Other [], specify:.....

2c. What is the dominant occupation of women in the community?

.....

Section II : WATER SOURCES

3. Sanitation facility:

- a. Flush toilet -private []
- b. Flush toilet -shared with other families []
- c. Latrine –private []
- d. Latrine –shared with other families []
- e. None/bush []
- f. Others []; specify:.....

4. Drinking water supply:

- a. Piped water into dwelling []
- b. Piped water into yard/plot/compound []
- c. Community standpipe []
- d. Borehole []
- e. Well fitted with hand-pump []
- f. Open well(cemented) []
- g. Open well(uncemented) []
- h. Surface water (river, dam, lake, etc.) []
- i. Other [], specify:.....

5. What was your source of water before the source in 5 above?

- a. Piped water into dwelling []
- b. Piped water into yard/plot/compound []
- c. Community standpipe []
- d. Borehole []
- e. Well fitted with hand-pump []
- f. Open well(cemented) []

- g. Open well(uncemented) []
 - h. Surface water (river, dam, lake, etc.) []
 - i. Other [], specify:.....
6. Who constructed your current source of water?
- (i) Central government []
 - (ii) Local government []
 - (iii) Non-governmental organization []
 - (iv) Community []
 - (v) An individual []
 - (vi) Other []; specify:.....
7. What was contribution of women in the provision of the water supply facility?
- (i) Clearing of site []
 - (ii) Financial contribution []
 - (iii) Carrying pipes []
 - (iv) Performing other unskilled construction work []
 - (v) None of the above []
 - (vi) Other []; specify:.....
8. Were you (women) involved in the planning and designing of the water supply facility?
- (i) Yes []
 - (ii) No []
- If No, why were you not involved?.....
9. Were you allowed to choose the design of your choice?
- (i) Yes []
 - (ii) No []
- If No, why?.....
10. If you were the opportunity to make a choice, which type of pump would you have preferred and why?
- a. Nira pump []
 - b. Afridev pump []
 - c. Indian mark []
 - d. Other []; specify:.....

11. During the installation of the water facility, which of the following activities did you participate in?

- a. Clearing of site []
- b. Provided labour []
- c. Financial contribution []
- d. Feeding of project staff []
- e. Accommodation of project staff []
- f. Carrying of pipes []
- g. Other []; specify:.....

12. What are your views about effectiveness of participation in the contribution of community members during the construction in 10 above?

- a. Very effective []
- b. Moderately effective []
- c. Not effective []

Section III: MAINTENANCE AND MANAGING MAINTENANCE

14. Do you have a WATSAN committee (caretakers) for the water facilities in your community, to ensure their continuous functioning?

- (i) Yes [] (ii) No []

15. If yes, who trains the caretakers?

- (a) Central government []
- (b) District assembly []
- (c) Non-governmental organization []
- (d) Community []
- (e) An individual []

16. Who is responsible for the daily maintenance of the water supply facility in your community?

- (a) WATSAN committee (care takers) []
- (b) District assembly []
- (c) GWSC/CWSD/DWMT []
- (d) Area mechanic []
- (e) Other, [], specify:.....

17. Do you pay levies for the use of the water facility?

- (i) Yes [] (ii) No []

18. If yes, how often do you pay?

- (i) Weekly []
(ii) Monthly []
(iii) Quarterly []
(iv) Every six months []
(v) Annually []
(vi) Other [], specify:.....

19. How much does each house/household pay?

20. What are these levies meant for?.....

21. Do you think it is necessary to pay for levies for the use of the water facility?

- (i) Yes [] (ii) No []

Please give reasons for any choice of response;.....

22. Who is responsible for collecting the levies?.....

23. How is such funds managed to ensure the availability of money for maintenance or repairs in the event of a breakdown?.....

Who is responsible for major repairs of the water facility?

- (i) WATSAN committee []
(ii) Area mechanic []
(iii) CWSD/DWMT []
(iv) District assembly []
(v) Other [], specify:.....

24. What is the waiting time between report of the fault and the response to repair?.....

25. During the waiting period, what is your alternative source (s) of water supply?

- (i) Borehole []
(ii) Well fitted with hand-pump []
(iii) Open well []

(iv) Surface water (dam, river, stream, etc.) []

(v) Other [], specify:.....

27. As a women group, do you often carry out communal labour to help maintain the water supply facility?

(i) Yes [] (ii) No []

If yes, what sort of communal labour do you undertake?

27b. How often do you undertake such exercise?

(i) Daily []

(ii) Weekly []

(ii) Monthly []

(iii) Quarterly []

(iv) Every six months []

(v) Yearly []

(vi) Other [], specify:.....

Appendix D

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

INTERVIEW SCHEDULE FOR OPINION LEADER

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

c) **Name of interviewer:**.....

Section I: BACKGROUND INFORMATION

(Tick where applicable)

1. Village:..... Community:.....

2. Sex i) Male [] ii) Female []

3a. Occupation in wet season:

a. Farming []

b. Trader []

c. Artisan []

d. Formal activities []

e. Other [], specify:.....

- 3b. Occupation in the dry season:
- a. Farming []
 - b. Trader []
 - c. Artisan []
 - d. Formal activities []
 - e. Other [], specify:.....

Section II: WATER SOURCES AND WATER FACILITIES

(Tick where applicable)

4a. Main source(s) of potable water in the community?

- a) borehole []
- b) well fitted with hand-pump []
- c) pipe born []
- d) dug out well []
- e) Surface water (stream, river, pond, etc.) []
- f) others, [], specify:.....

4b. If a and b as in 4a, who constructed the facility?

- a) government []
- b) district assembly []
- c) NGO []
- d) CWSP / GWSC []
- e) community []
- f) individual []
- g) Other [], specify:.....

4c. Who owns the water facility?

- a) government []
- b) district assembly []
- c) NGO []
- d) CWSP / GWSC []
- e) community []
- f) individual []
- g) Other [], specify:.....

4d. How did the community acquire the facility?.....

What was the contribution of the community in the provision of the water supply facility?

- a) Clearing of site []
- b) Digging []
- c) Carrying of pipes []
- d) Performing other unskilled construction works []
- e) Financial contribution []
- f) Other [], specify:.....

6a. Were you involved in the planning, designing, and construction of the facility?

- a) Yes []
- b) No []

6b. If yes, were you allowed to choose the design you most desire?

- a) Yes []
- b) No []

6c. Please give a reason for any choice of response in 6b above;

.....

Section III: MAINTENANCE AND MANAGING MAINTENANCE

(Tick where applicable)

7. Who is responsible for maintenance of the water facility?

- a) Unit committee []
- b) water point committee []
- c) Care takers []
- d) district assembly []
- e) GWSC/CWSD/DWMT []
- f) other, specify.....

8. Do you think it is necessary to pay for the O & M of the facility?

- a) Yes []
- b) No []

9. Do you pay or contribute financially towards the operation and maintenance of the water facility?

- a) Yes []
- b) No []

9b. If yes, what funding system for operation and maintenance do you use in your community?.....

9c. Why did you adopt this particular system of funding to others?.....

10. How much do each house/household pay or contribute towards the maintenance of the of the water facility?.....

11a. Who is responsible for collecting the tariffs?

- a) Assembly man/ unit committee member []
- b) WATSAN committee []
- c) District assembly []
- d) NGO []
- e) Other [], specify:.....

11b. How is such contribution or payments managed to ensure the availability of funds for maintenance?.....

12a. Who is responsible for minor repairs or maintenance of the facility?

- a) WATSAN committee (care takers) []
- b) Area mechanics []
- c) District assembly []
- d) NGO []
- e) CWSD/DWMT []
- f) Other [], specify:.....

12b. If WATSAN committee (care taker), are they paid for the services they render to the community?

- a) Yes []
- b) No []

12c. If yes, who pay them and what is their current salary level?.....

13a. Who is responsible for repairs of the water facility in the event of a major breakdown?

- a) WATSAN committee (care takers) []
- b) Area mechanics []
- c) District assembly []
- d) NGO []
- e) CWSD/DWMT []
- f) Other [], specify:.....

13b. What is the waiting period between report of pump failure or fault and the response to repair it?.....

13c. During the waiting period, what is your alternative source(s) of water supply?

- a) Borehole []
- b) Pipe borne water []
- c) Well fitted with hand-pump []
- d) Open cemented well []
- e) Open uncemented well []
- f) Dug out []
- g) Surface water (river, dam, stream etc.) []

- 14a. Do you have a water committee in your community?
a) Yes [] b) No []
- 14b. If yes, have been effective in ensuring the proper management of the water supply facility?
a) Yes [] b) No [] c) Indifferent []
15. Are there alternative community structures which could effectively manage the facilities other than the water committee?
a) Yes [] b) No []
If yes, name them;.....
- 16a. Do you encounter any problem(s) in relation to facility management?
a) Yes [] b) No []
If yes, please list them;.....
- 16b. In your opinion, how can these problems be soled?.....
- 17a. Do some of the community members still draw water from the traditional source(s) of water?
a) Yes [] b) No []
- 17b. If yes, which type?
a) Dug out []
b) Surface water (river, dam, stream, pond etc.) []
c) Shallow well []
d) Other [], specify:.....
- 17c. For what purpose do they use the water for?
a) Drinking []
b) Washing []
c) Bathing []
d) For building purposes []
e) Other [], specify:.....
- 17d. Why do they still use the traditional source(s) of water?
a) Proximity []
b) Frequent pump failure []
c) Inability to afford tariffs []

- d) Over crowding at pump site []
- e) Taste []
- f) Tradition []
- g) Other [], specify:.....

18. In your view, what is the percentage of people using the traditional source(s) of water?.....

19. Has there been any illness associated with the patronage of the traditional source(s) of water?

- a) Yes []
- b) No []

If yes, which of the diseases (tick as many as apply)

- a) Cholera []
- b) Guinea worm []
- c) Bilharzia []
- d) River blindness []
- e) Diarrhea []
- f) Polio []
- g) Malaria []
- h) Other [], specify:.....

20. Has your community benefited in any way from the water supply facility(s), since their installation?

- a) Yes []
- b) No []

If yes, please list them:.....

Appendix E

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

**INTERVIEW SCHEDULE FOR ASSEMBLY MEMBER OR UNIT
COMMITTEE MEMBER**

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

d) **Name of interviewer:**.....

Section I: BACKGROUND INFORMATION

(Tick where applicable)

3. Village:..... Community:.....

4. Sex i) Male [] ii) Female []

3a. Occupation in wet season:

a. Farming []

b. Trader []

c. Artisan []

d. Formal activities []

e. Other [], specify:.....

3b. Occupation in the dry season:

a. Farming []

b. Trader []

c. Artisan []

d. Formal activities []

e. Other [], specify:.....

Section II: WATER SOURCES AND WATER FACILITIES

(Tick where applicable)

4a. Main source(s) of potable water in the community?

a) borehole []

b) well fitted with hand-pump []

c) pipe born []

d) dug out well []

e) Surface water (stream, river, pond, etc.) []

f) others, [], specify:.....

4b. If a and b as in 4a, who constructed the facility?

a) government []

b) district assembly []

c) NGO []

d) CWSP / GWSC []

e) community []

f) individual []

g) Other [], specify:.....

4c. Who owns the water facility?

a) government []

b) district assembly []

c) NGO []

d) CWSP / GWSC []

e) community []

f) individual []

g) Other [], specify:.....

4d. How did the community acquire the facility?.....

6. What was the contribution of the community in the provision of the water supply facility?

a) Clearing of site []

b) Digging []

c) Carrying of pipes []

d) Performing other unskilled construction works []

e) Financial contribution []

f) Other [], specify:.....

6a. Were you involved in the planning, designing, and construction of the facility?

- a) Yes []
- b) No []

6b. If yes, were you allowed to choose the design you most desire?

- a) Yes []
- b) No []

6c. Please give a reason for any choice of response in 6b above;.....

Section III: MAINTENANCE AND MANAGING MAINTENANCE

(Tick where applicable)

7. Who is responsible for maintenance of the water facility?

- a) Unit committee []
- b) water point committee []
- c) Care takers []
- d) district assembly []
- e) GWSC/CWSD/DWMT []
- f) other, specify.....

8. Do you think it is necessary to pay for the O & M of the facility?

- a) Yes []
- b) No []

9. Do you pay or contribute financially towards the operation and maintenance of the water facility?

- a) Yes []
- b) No []

9b. If yes, what funding system for operation and maintenance do you use in your community?.....

9c. Why did you adopt this particular system of funding to others?.....

10. How much do each house/household pay or contribute towards the maintenance of the of the water facility?.....

11a. Who is responsible for collecting the tariffs?

- a) Assembly man/ unit committee member []
- b) WATSAN committee []
- c) District assembly []
- d) NGO []
- e) Other [], specify:.....

11b. How is such contribution or payments managed to ensure the availability of funds for maintenance?.....

12a. Who is responsible for minor repairs or maintenance of the facility?

- a) WATSAN committee (care takers) []
- b) Area mechanics []
- c) District assembly []
- d) NGO []
- e) CWSD/DWMT []
- f) Other [], specify:.....

12b. If WATSAN committee (care taker), are they paid for the services they render to the community?

- a) Yes []
- b) No []

12c. If yes, who pay them and what is their current salary level?.....

13a. Who is responsible for repairs of the water facility in the event of a major breakdown?

- a) WATSAN committee (care takers) []
- b) Area mechanics []
- c) District assembly []
- d) NGO []
- e) CWSD/DWMT []
- f) Other [], specify:.....

13b. What is the waiting period between report of pump failure or fault and the response to repair it?.....

13c. During the waiting period, what is your alternative source(s) of water supply?

- a) Borehole []
- b) Pipe borne water []
- c) Well fitted with hand-pump []
- d) Open cemented well []
- e) Open uncemented well []
- f) Dug out []
- g) Surface water (river, dam, stream etc.) []

- 14a. Do you have a water committee in your community?
a) Yes [] b) No []
- 14b. If yes, have been effective in ensuring the proper management of the water supply facility?
a) Yes [] b) No [] c) Indifferent []
15. Are there alternative community structures which could effectively manage the facilities other than the water committee?
a) Yes [] b) No []
If yes, name them;.....
- 16a. Do you encounter any problem(s) in relation to facility management?
a) Yes [] b) No []
If yes, please list them;.....
- 16b. In your opinion, how can these problems be soled?.....
- 17a. Do some of the community members still draw water from the traditional source(s) of water?
a) Yes [] b) No []
- 17b. If yes, which type?
a) Dug out []
b) Surface water (river, dam, stream, pond etc.) []
c) Shallow well []
d) Other [], specify:.....
- 17c. For what purpose do they use the water for?
a) Drinking []
b) Washing []
c) Bathing []
d) For building purposes []
e) Other [], specify:.....
- 17d. Why do they still use the traditional source(s) of water?
a) Proximity []
b) Frequent pump failure []
c) Inability to afford tariffs []

- d) Over crowding at pump site []
- e) Taste []
- f) Tradition []
- g) Other [], specify:.....

18. In your view, what is the percentage of people using the traditional source(s) of water?.....

19. Has there been any illness associated with the patronage of the traditional source(s) of water?

- a) Yes []
- b) No []

If yes, which of the diseases (tick as many as apply)

- a) Cholera []
- b) Guinea worm []
- c) Bilharzia []
- d) River blindness []
- e) Diarrhea []
- f) Polio []
- g) Malaria []
- h) Other [], specify:.....

20. Has your community benefited in any way from the water supply facility(s), since their installation?

- a) Yes []
- b) No []

If yes, please list them:.....

Appendix F

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

INTERVIEW SCHEDULE FOR WATER USERS

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

e) **Name of interviewer:**.....

Section I: BACKGROUND INFORMATION.

Please tick where appropriate.

1. Village:.....Community;.....

2. Sex; (i) male [] (ii) female [].

3. Age;.....

4a. Occupation in the wet season:

(a) Farmer []

(c) Trader []

(b) Public servant [] (d) Other [],
specify:.....

4b. Occupation in the dry season:

a) Farmer [] (c) Trader []
(b) Public servant [] (d) Other [],
specify:.....

Section I: WATER SOURCES.

5. Which of the following water sources is/are available in your community?

- (a) Pipe born water []
- (b) Bore hole []
- (c) Well fitted with hand-pump []
- (d) Open well []
- (e) Others []; Specify.....

6. Who constructed the water source in (5) above?

- (a) Central government []
- (b) Local government []
- (c) Non-governmental organization []
- (d) Community []
- (e) An individual []
- (f) Other []; specify:.....

7. Did you contribute to the provision of the water facility? i. Yes [] ii. No []

8. If yes, what was your contribution in the provision of the water supply facility?

- (a) Clearing of site []
- (b) Financial contribution []
- (c) Carrying pipes []
- (d) Performing other unskilled construction work []
- (e) None of the above []

- (f) Other []; specify:.....
9. Were you (water user) involved in the planning and designing of the water supply facility?
- (a) Yes [] (b) No []
- If No, why were you not involved?.....
10. Were you allowed to choose the design of your choice?
- (a) Yes [] (b) No []
- If No, why?.....
11. During the installation of the water facility, which of the following activities did you participate in?
- (a) Clearing of site []
- (b) Provided labour []
- (c) Financial contribution []
- (d) Feeding of project staff []
- (e) Accommodation of project staff []
- (f) Carrying of pipes []
- (g) Other []; specify:.....
12. What are your views about effectiveness of participation in the construction of the water supply facility by community members in 10 above?
- (a) Very effective []
- (b) Moderately effective []
- (c) Not effective []
12. Is the water supply facility functioning now?
- (i) Yes [] (ii) No []
13. How often does the water facility spoil?.....

Section II: MAINTENANCE OF WATER SUPPLY FACILITY.

18. Who is responsible for the daily operation and maintenance of your water supply facility?

- (a) WATSAN Committee (Care takers) []
- (b) District assembly []
- (c) CWSA []
- (d) DWMT []
- (e) Non-governmental organization []
- (f) The community []
- (g) An individual []
- (h) No body []

19. If (a), as in (14) above, how are members of the committee selected?

.....

20. Who does the selection and training of the WATSAN committee members?

- (a) District assembly []
- (b) CWSA []
- (c) N.G.O []
- (d) DWMT []
- (e) Other []; specify:.....

21. In your opinion, are WATSAN committee members paid in your community?

- (a) Yes []
- (b) No []

If yes, who pays them?.....

22. If community as in (14) above, who mobilizes the community members?

- (a) Central government []
- (b) District assembly []
- (c) Chiefs []
- (d) Religious bodies []
- (e) Others []; specify:.....

23. What is the contribution of the community to ensure maintenance of the water supply facility?

- (a) Clearing weeds around water facility []
- (b) Daily cleaning of surrounding []

- (c) Ensure proper use of facility []
- (d) Minor daily maintenance []
- (e) Other []; specify:.....

24. Who is responsible for major repairs in the event of a breakdown?

- (a) WATSAN committee []
- (b) Area mechanics []
- (c) District assembly []
- (d) CWSA []
- (e) Community []
- (f) N.G.O []
- (g) Other []; specify:.....

21. If not community as in 20, what is the waiting period between report of the fault and the attendance or response to repair it?.....

22. During the waiting period, what is your alternative source (s) of water supply?

- (a) Distant bore hole []
- (b) Cemented well []
- (c) Dug out []
- (d) Open uncemented well []
- (e) Stream/river/pond []
- (g) Other []; specify:.....

Section III: MANAGING THE MAINTENANCE OF WATER SYSTEMS.

23. How do you contribute to managing the water systems to ensure their continuous existence?.....

24. Currently what institutional or organizational backing do your community have to ensure the successful management of the maintenance of your water systems?.....

25. How helpful have the district assembly been to provide requisite support?

- (a) Financial assistance []
- (b) Technical assistance []

(c) Material assistance []

(d) Human resource development []

(e) Moral support []

26. Is there a regular supply of spare parts for the repair of boreholes and hand-pump wells? (i) Yes [] (ii) No []

27. Are there always funds available to buy spare parts in the event of breakdowns in the water systems? (i) Yes [] (ii) No []

Appendix G

**UNIVERSITY OF CAPE COAST
CENTRE FOR DEVELOPMENT STUDIES**

INTERVIEW SCHEDULE FOR AREA MECHANICS

Dear respondent,

This interview schedule seeks information on Managing the Maintenance of rural water systems in the Builsa District. You are therefore being invited to share your views on the issues under investigation. The information is purely for academic purposes. Information provided will be treated as confidential. Please could you give me a little time to participate in the study?

If you are unhappy about the questions, you can tell me at any time and we will stop the interview.

Kindly be candid in your responses.

Thank you.

To be completed by interviewer at the time of the survey

Date and time of interview:

Day of the week (e.g. Monday):.....

Date (DD/MM/YYYY):.....

Time Started:..... Time Ended:.....

f) **Name of interviewer:**.....

Section I: Background Information

1. Sex i. Male ii. Female

2. Age:

3. Marital status

i. Married

iv. Widowed

ii. Single

v. Separated

iii. Divorced

vi. Other, ,specify:

4. Number of children

5. Educational attainment

- | | | | |
|-----------------------------|--------------------------|---------------------|--------------------------|
| i. No education | <input type="checkbox"/> | iv. Middle Sch./JHS | <input type="checkbox"/> |
| ii. Primary | <input type="checkbox"/> | v. sec./tech./voc | <input type="checkbox"/> |
| iii. Poly /teacher training | <input type="checkbox"/> | vi. University | <input type="checkbox"/> |
| vii. Other, _____, specify: | <input type="checkbox"/> | | |

6a. Do you engage in other income earning economic activities?

- i. Yes ii. No

6b. if yes, please list all these activities

- i.
- ii.

Section II: WORK RELATED ISSUES

(Please tick where applicable)

7. When did you begin your career as an area mechanic?.....

8a. How many villages are under your care?

8b. How many communities do you operate in?

9. How do you rate the pump repair work against you other economic activities?

- i. 1
- ii. 2
- iii. 3
- iv. 4
- v. 5

(Note: 1 is the least and 5 is the highest)

10a. Who selected you as an area mechanic?

- i. District assembly
- ii. CWSA
- iii. NGO
- iv. Community

v. Other _____, specify:.....

10b. How were you selected?

10c. Who is responsible for your salary?

11. How many pumps are you in charge of in your sector?

- i. Below 10
- ii. 10-20
- iii. 21-30
- iv. 31-40
- v. 41-50
- vi. Above 50

12. What is the distance (in kilometers) to the farthest pump in your sector?

- i. Below 20km
- ii. 21-40 km
- iii. 41-60 km
- iv. 61-80km
- v. 81-100 km
- vi. 101-130 km
- vii. 131-150 km
- viii. Above 15 km

13a. Which of the following do you use as means of transport to work?

- i. Walking
- ii. Bicycle
- iii. Motorbike
- iv. Motor car
- v. Pickup (4x4)
- vi. Truck
- vii. Other specify:

13b. With the exception of i and vii in 13a, what is the general condition of your means of transport?

- i. Good
- ii. Poor
- iii. Broken down

13c. What is the average maintenance cost on your means of transport per month.
 (Maintenance cost include fuel and general repairs)

13d. In case of a breakdown, what is your alternative means of transport to the
 community?.....

14a. Do you have sufficient tools? i. Yes ii. No

14b. how regular do you maintain these tools?

- i. Weekly
- ii. Fortnightly
- iii. Monthly
- iv. Quarterly
- v. Half yearly
- vi. Yearly
- vii. Other specify:

14c. What is the average expenditure on maintenance of tools in the last 2 years?

- i. Below ₪50,000
- ii. ₪51, 000-₪100,000
- iii. ₪101,000-₪150,000
- iv. ₪151,000-₪200,000
- v. ₪201,000-₪250,000
- vi. Above ₪250,000

15. Do you keep records of your activities?

- i. Yes Go to 16
- ii. No , explain why

16a. Repair activities for the past 3 years

Intervention after call	2004	2005	2006
Number of repairs			
Average fee per repair			

16b. What is the average waiting period between report of pump failure and your attendance or response to repair pump?

17a. Which periods of the year do you receive the most calls or reports from communities with regards to pump failure?

- i. Rainy season
- ii. Dry season
- iii. Other, specify.....

17b. Please give reasons for any choice in 17a.

18a. Do you train community members or WATSAN committee members on routine preventive measures to ensure effective usage? i. Yes ii. No

18b. If yes, indicate the number of communities;

18c. What is the nature of the arrangement between you and the communities?
.....

19a. Do you encounter problems in dealing with community WATSAN committees? i. Yes ii. No

19b. If yes, list the problems;

19c. In your opinion, how can the problems be solved?

20. How far is your workshop to the nearest spare parts shop?(km)

21a. Do you get all the spare parts you need when you visit the shop?

- i). Yes
- ii). No

If no, explain:

21b. Are the spare parts affordable, considering the economic standards of the communities? i. Yes ii. No

21c. If no, do you have any suggestions that may help make spare parts more affordable to communities in the district?

22. Do you encounter any problem (s) with spare parts dealers?

- i. Yes
- ii. No

If yes, how can the problem (s) be solved?

23a. What problems do you encounter in carrying out your duties as an area mechanic?

23b. what are the possible solutions to solving the problem (s)?