UNIVERSITY OF CAPE COAST

ASSESSMENT OF COMMUNITY WATER AND SANITATION PROGRAMMES IN EJISU-JUABENG MUNICIPALITY

EBENEZER DUODU ADDO

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BY

EBENEZER DUODU ADDO

DISSERTATION SUBMITTED TO THE INSTITUTE FOR DEVELOPMENT STUDIES OF THE FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF CAPE COAST, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS DEGREE IN HUMAN RESOURCE MANAGEMENT

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation 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.

Candidate's Name: Ebenezer Duodu Addo

Signature…… Date……...

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidance on supervision of dissertation laid down by the University of Cape Coast.

Supervisor' Name: Mr. Justice S. Anoff

Signature…… Date……..

ABSTRACT

The study was to assess community water and sanitation programmes and its effects on sustainable water and sanitation delivery.

Water and sanitation are an important aspect every human development. Without access to safe drinking water and sanitation, people are likely to suffer from sanitation and related. Primary data was gathered through household surveys using interview schedules and unstructured interviews with key individuals from water and sanitation committees and Department of Waste Management in the Ejisu-Juabeng Municipality.

The findings indicated that the provision of water and sanitation facilities was basically done by the Municipal Assembly, private operators and individuals. So Secondly, there was inadequacy of facilities to meet the growing demand of water and sanitation needs of the population. It was also found out that good or poor participation affects the sustainability of the facilities either positively or negatively. While participation promoted ownership and management, thus ensuring sustainability of these facilities, poor participation did the opposite.

In addition, there was frequent break downs of facilities especially boreholes and major organisations that facilitates technical assistance were the Ejisu-Juabeng Municipal Assembly, Zoomlion Company Limited, WATASN Committees and Care Takers. Funds for the provision of the facilities were the Municipal Assembly, development partners and beneficiaries. The study recommended that additional facilities should be provided to serve the growing population. Also, beneficiaries should be educated on the need to participate in projects implementation and sustainability.

ACKNOWLEDGEMENTS

Thesis writing is a knowledge sharing exercise. Inasmuch as the effort that is put in one needs to make references from other works or gather information from other people to complete the study.

I am particularly grateful to my supervisor, Mr. Justice Anoff, former Research Fellow, Institute for Development Studies, UCC, whose analytical mind, painstaking criticism and guidance helped in the ultimate production of this work.

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I am immensely grateful to Messrs Ferdinand Addo and Reginald Andoh for their kind assistance and their support. I must acknowledge the contribution of Miss Jacqueline Danso who did an excellent work in typing the manuscripts.

My sincerest gratitude goes to my wife, Mercy, whose support and encouragement kept me focused on this study.

I must, however, admit that any errors and omissions, substantial or marginal, which may be found in this thesis, are entirely my responsibility.

DEDICATION

To my children, Ferdinand Addo, Gerald Ansah Addo and Barbara Afi Addo.

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LIST OF ACRONYMS

ADB	-	Agriculture Development Bank
CISDL	-	Centre for International Sustainable Development Law
CWSA	-	Community Water and Sanitation Agency
DRA	-	Demand Responsive Approach
EPA	-	Environmental Protestation Agency
IDC	-	International Development Centre
ILO	-	International Labour Organization
GPRS II	-	Growth and Poverty Reduction Strategy II
GWAC	-	Ghana Water and Sewerage Corporation
MDG	-	Millennium Development Goals
MWRWH	-	Ministry of Water Resources, Works and Housing
NCWSP	-	National Community Water and Sanitation Programme
NGO	-	Non-Governmental Organizations
NSDS	-	National Sustainable Development Strategies
NWP	-	National Water Policy
SPSS	-	Statistical Product for the Service Solutions
SWOT	-	Strengths, Weaknesses, Opportunities and Threats
UNEP	-	Nations Environment Programme
VLOM	-	Village Level Operation and Management of Maintenance
WCED	-	World Commission on Environment and Development
WEDC	-	Water, Engineering and Development Centre
WHO	-	World Health Organization
WRIDA	-	Water Resources Information and Development Agencies

CHAPTER ONE

INTRODUCTION

Background to the study

Water is a very important aspect of human life. It is needed for daily survival and without safe water many lives are lost. It is reported that more than three million people die every year from water-related diseases (World Health Organization [WHO], 2002). Its numerous uses and benefits to life cannot be ignored. Basic water and sanitation facilities are therefore needed to making living very convenient and easy. Improving access to clean drinking water and safe sanitation is one of the least expensive and most effective means to improve public health and save lives.

The concept of clean water and safe sanitation is very essential to health. Although sanitation is important for the safe disposal of excreta (the source of pathogens that cause the majority of water, sanitation and hygiene-related diseases) it has not received the same attention as water treatment (Montgomery of Menachem, 2007). Improving sanitation has the tendency of directly or indirectly reducing diseases. Improved water supply and improved sanitation can reduce diarrhoea morbidity by 21 percent and 37 percent respectively (International Development Centre [IDC], 2007).

Statistics, however, show that 1.1 billion people lack access to safe

drinking water. About 2.6 billion people lack adequate sanitation. Every year, 1,800,000 people, 90 percent of whom are children under the age of five, die from diarrheal diseases including cholera, malaria and dysentery. The number of deaths per 1000 children younger than one year of age that are attributable to diarrheal diseases are most severe in sub-Saharan Africa, where 42 percent of the population is without improved water, 64 percent is without improved sanitation. Nearly 60 percent of infant mortality is linked to infectious diseases, most of them water, sanitation and hygiene-related (WHO/UNICEF, 2002; JMP, 2004).

To face the crises, the Millennium Development Goals (MDGs), dedicated to reduce poverty and ensure sustainable development. Goal number seven, target 10 is to: "halve, by 2015, the proportion of people without sustainable access to safe water."

In order to meet the water supply and sanitation target, an additional 260,000 people per day up to 2015 and an additional 370,000 people should gain access to improved water sources. WHO has also declared 2005-2015 the decade of water, with the goal of establishing the framework to provide full access to water supply and sanitation for all people (WHO, 2004). What comes to mind immediately then is the need for increased investments in water supply to the un-served population.

In galvanizing action towards the realization of this MDGs, it is easy to overemphasize new water projects across the world to the neglect of sustaining already existing ones. It is important to understand that coverage of water supply will not increase if already existing water schemes continue to break down

helplessly.

The Growth and Poverty Reduction Strategy II (GPRS II 2006-2009) confirms the intentions to ensure access to safe water to 85 percent of the population by 2015, boldly exceeding the MDGs of 73 percent. Currently, 53 percent of the populations in Ghana have access to safe water while only 18 percent have improved latrines, which is among the lowest rates in West Africa. There has been a rapid improvement in sanitation from 43 percent in 1990 to 58 percent in 2002, recording a percent increase of 25 percent (UNICEF/WHO, 2002).

Ghana suffers from endemic Guinea worm, a severely debilitating water–related disease, Buruli Ulcers, River blindness, Bilharzias and many more water related water diseases resulting from pollution from human faeces, and other pollutants; as a result of the use of surface water such as rivers, streams, lakes, ponds and other unprotected water sources such as hand dug wells which are traditionally the water supply sources of about 54 percent of the population who live in rural areas (Wikipedia, 2008).

This therefore shows the importance of providing safe water supply and sanitation facilities as one of the water and sanitation programmes in Ghana to these communities to help improve their living conditions. Sound strategies for community water supply and sanitation programmes in the country should therefore be based on; a clear understanding of the existing problems, the beneficial impacts achievable, and the factors which determine sustainability.

Planning, financing, construction as well as operations and maintenance

have been the full responsibility of the government and other providers of water and sanitation facilities. Past experience in Ghana has shown that such facilities provided directly by institutions without the active participation of the end users are not properly maintained and operated and thus unsustainable. This can be attributed to the fact that decision making was centralized (Kleemeier, 2002).

However, for maximum benefits, participation has to be viewed as a process that involves beneficiaries in decision making from the beginning to the end of a project. Sustainability, in this sense is of continued delivery and uptake of services, which is threatened by numerous attitudinal, institutional and economic factors, of which community participation approaches alone are no guarantee of success. The key to sustainability is that all stakeholders involved in the consumption and use, maintenance and operation, motivation, cost recovery, and continuing support, perceive it in their best interests to deliver high-quality services (Addai, 2005).

Without the motivation of the community to utilize the new source (or excreta disposal facility), sustainability is doomed. The users must believe that the new source is preferable to their traditional source. The obvious and immediate benefit of an improved water source is usually access, or proximity, while valuing of health benefits may not be prominent. On the contrary, the taste of "safe" water may be unfamiliar, and the universal conservatism of consumers may be an obstacle to change. Health education, and involvement of the community, to the extent of vesting ownership in them, will usually be necessary to bring about such motivation. Although this may be a time-consuming activity

at the beginning of a programme, it is common for demand, and levels of motivation, to grow rapidly as the benefits of clean water become more visible. A significant further obstacle to the motivation of a community to use a new source may be the change from "free" water to some system of cash payment.

Motivations, value, worthwhile, or self-interest are essential features of the involvement of all stakeholders, not only the individual consumers. Caretakers and committees within the community, Government or Non-Government organizations providing back-stopping for maintenance, those organizing revenue collection, local Government, and private sector stakeholders should all perceive participation and the delivery of high quality services as in their own interests, financial or otherwise.

Despite the emphasis during and since the United Nations Water Decade (1981-90) on VLOM (Village Level Operation and Management of Maintenance), a clearly structured, resourced, and trained maintenance organisation is necessary (Arlosorff *et al*., 1987; Reynolds, 1992). The community-appointed caretaker(s) or committee may have an important role in maintenance (for which they need training), but in almost all circumstances they will need backstopping by some district, regional, or national level organisation. This Government agency or NGO will also need resourcing and training. Communication lines between community and backstopping agency need to be clear, and response times need to be rapid. Spare parts and tools, and appropriate forms of transport, must be available.

Staffing, training, transport, spare parts, materials, tools, and replacement

units all cost money, and some (as few as possible ideally) involve foreign exchange. In times of increasing financial stringency and realism, the trend is to place this burden of recurrent cost on the community (Abrams, 1998). Whether this is right or wrong, it is a pragmatic response to the fact that developing country governments are grossly under-resourced, and even international NGOs have finite resources. The level of payment, including any subsidies, the basis of payment (by volume, or flat rate per household), and the means of administering and accounting for water charges, all have to be decided, preferably by the community.

Using evidence from the field, Reynolds (1992) makes it clear that community enthusiasm for keeping water committees functioning, for adopting improved hygiene practices, and continuing the collection of revenue for recurrent expenses, can wane within two or three years of construction. It is essential that the supporting government or NGO maintains responsibility for such follow-up. This is a long term function, with a need to continue until there is such a 'critical mass' of good practice within a district, that there is no going back. This notion of continuing support is in opposition to limited term 'projectisation'; the fact is however, that water and sanitation provision in developing countries can only work as a long term service managed jointly by community and external support agencies (Government and/or NGO together with donor or lender). Short term projects thus fail.

Sustainability objectives

It is possible to set targets or objectives for the achievement of sustainability in practice. Ultimately the test of sustainability is whether facilities are functioning and being utilised. As means to this end, the functioning of community level caretakers and committees, including, especially, their revenue collection activities, should be effective. The backstopping agency should continue to be visible to the community, carrying on its education and training, encouragement, and maintenance support role (Carter *et al*., 1996).

In this opening address during the 19th Water, Sanitation, Environment and Development Conference held in Accra, Ghana in 1993, the then Minister of Works and Housing, reminded participants that the basic definition of quality of life or standard of living according to the International Labour Organisation (ILO) is the "ability of the head of the household to provide goods and services to sustain and enjoy life"… "Some of the vital goods and services needed for sustaining and enjoying life are water, sanitation and available environment which will lead to development since performance or behavior is a function of the individual and environment". The provision of water and sanitation is further given meaning in the National Community Water and Sanitation Programme (NCWSP).

The NCWSP programme emphasizes better water supply, hygiene practices in rural communities and small towns in Ghana. It asserts that many rural communities and small towns do not have safe water supply and latrines. Some may have, but they are not working well or are broken down. If people do

not have safe water and toilets, they will become ill. Thus, the NCWSP is to improve health. Estrey *et al*. (1990) showed that there was a relationship between water, sanitation and diseases, which include various types of diarrhoea, worm infestations, skin and eye infections and vector borne diseases. He further stressed that over the years many studies have been carried out to increase insight into the prevention of these diseases. The studies indicated that, depending on the type of disease and local circumstance the following preventive measures are particularly helpful in interrupting disease transmission: safe human hygiene, domestic hygiene (and animal management), food hygiene, water hygiene/consumption of safe water and safe water disposal and drainage. This suggests that improved water supply and sanitation facilities are important measures in preventing water and sanitation diseases

Statement of the problem

Access to water supply and sanitation is a fundamental need and a human right. It is vital for the dignity and health of all people. Unsafe water, inadequate sanitation and insufficient hygiene practices account for an estimated 9.1 percent of the global burden of disease and 6.3 percent of all deaths. This means that safe water, adequate sanitation and good hygiene practices have the potential to prevent at least 9.1 percent of the global disease burden and 6.3 percent of all deaths (Prüss-Üstün *et al*., 2008).

Water supply and sanitation situation in Ghana is inadequate. Most of the populations, urban and rural alike, do not have access to safe and adequate water

supplies and sanitation facilities. According to Ghana Water and Sewerage Company, of the 6574 pumps it maintains, 903 (14%) are out of service for mechanical reasons. About 40 percent of the Ghana Water Company Limited's transferred systems are in a state of disrepair and required rehabilitation. The other 60 percent were under various stages of rehabilitation with about 25 percent completed (Manu, 2001).

In addition, few households show sufficient understanding of environmental sanitation or hygienic practices regarding water and sanitation. As a result, three-fourths of the health problems in Ghana are due to communicable diseases attributable to unsafe/inadequate water supply, and unhygienic/unsanitary waste management, particularly excreta. Diarrhoeal diseases caused by improper management of water and sanitation is among the major causes of infant and child morbidity and mortality (Ministry of Water Resources, Works and Housing [MWRWH, 2005).

Problems with sanitation are intensified when there is inadequate drainage and waste removal. Where sanitation is poor, many people must defecate in the open, or into plastic bags or paper thrown out with the household garbage. Excreta can accumulate rapidly in open areas and on garbage piles. Uncollected garbage is also frequently dumped in drainage ways, which quickly become clogged. When wastewater and storm water cannot be easily drained, flooding spreads waste and excreta widely throughout the surrounding area (Bartlett, 2003).

The increased magnitude of environmental health problems in urban and

rural settings of the country demands community-based studies that would facilitate a better understanding of the issues and influence policy and decision-making at the community, town, regional and national level. Therefore, this study aimed to assess water and sanitation programmes in the Ejisu-Juabeng Municipality in order to give insight about the magnitude of water and sanitation challenges and optimise actions to be prioritised in the prevention of water and sanitation related diseases.

Objectives of the study

The general objective of this study was to assess community water and sanitation programmes and its effects on sustainable water and sanitation delivery in Ejisu-Juabeng Municipality.

The specific objectives of the study are to:

1. assess measures that have been put in place to ensure sustainability.
2. identify the sources of funding for the provision of facilities.
3. examine the level of participation of beneficiary communities in the provision of these facilities.
4. assess the funds, competence and technological capacity of personnel or people to maintain facilities.
5. make recommendations that can help ensure sustainability of water and sanitation facilities.

Research questions

The questions rising out of this problem are the following:

1. What measures have been put in place to ensure sustainability?
2. What are the sources of funding for the provision of facilities?
3. What are the levels of participation of beneficiary communities in the provision of facilities?
4. What are the levels of competence in technological capacity of personnel to maintain facilities?

Significance of the study

As water and sanitation services has been given attention in government policies, strategies and plans; the study would help to bring out the accessibility, availability and utilisation of the water and sanitation services. In addition, the information gathered from the research would inform the activities of the Community Water and Sanitation Agency, to best achieve its goal of improved environmental health through better water and environmental sanitation services.

It is hoped that the findings of this study would help raise awareness on issues pertaining to water and sanitation for the community and policy makers especially at the local level. This awareness would help build further initiatives to reduce the problem. It would help provoke debate on water and sanitation issues. In the course of this debate better options may be developed. This research would highlight the role of the different stakeholders and the extent to which they have been active in addressing the water and sanitation problems. Urban authorities

would also make use of the findings of this study helpful in their planning strategies. Embarking on this research would therefore serve as a guide to government, planners as well as beneficiary communities.

Scope of the study

The geographical scope of the study is the Ejisu-Juabeng Municipality located in the central part of the Ashanti Region with Ejisu as its capital. It shares boundaries with the Kumasi Metropolitan Assembly and the Kwabre District to the east, Afigya Sekyere and Asante Akim North Districts to the west and the Bosomtwe Atwima Kwanwoma and Asante Akim South Districts to the south. The District lies within latitude $1^0$15'N and $1^0$45'N and longitudes $6^0$15'W and $7^0$00'W. The conceptual scope of the study is to research is to assess water and sanitation programmes in the Municipality.

Limitation

Even though, the researcher has a fair idea of what pertains in the Municipality and is also quite familiar with the area, the project has not been that easy, because, the natives of the communities where the samples were taken did not initially understand why they should give out information of the communities to him and what he was going to do with that information.

Until they were convinced, they thought the researcher was going to indict them based on the information they will give. And they couldn't understand why they should spare some of their time they would have used to do their farm work

or mining activities to give answers to the questions they thought was irrelevant to them. This was all because of the misconception they had about the provision of potable water, its taste and the smell.

Delimitation

The focus of the research was on the Ejisu-Juabeng Municipality but related to other districts, municipals and communities with similar characteristics. However, sampling procedure and the details in the research instrument makes them peculiar to the Ejisu-Juabeng Municipality and thus generalization to other jurisdictions could be unreliable.

Organisation of the study

The study is organized into five chapters. Chapter one is the introduction and covers the background to the study, statement of the problem, objectives, research questions, and significance of the study, limitations and delimitation of the study and scope of the study. Chapter two is review of relevant literature. Chapter three is the methodology. It focuses on the research design, data collection, population, sample, research instruments and data collection. The results and discussions are in chapter four. Chapter five presents a summary of findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Improving global as well as local access to clean drinking water and safe sanitation is one of the least expensive and most effective means to improve public health and saves lives. However, global figures that describe the lack of water and sanitation services are alarming. More than 1.1 billion people do not have access to improved drinking water supplies. Lack of sanitation is an even larger problem; an estimated 2.6 billion individuals live without improved services (Montgomery and Menachem, 2007).

In an effort to bring global attention and resources to the problem, international organizations have created several water and sanitation initiatives. WHO has declared 2005-2015 the decade of water, with the goal of establishing the framework to eventually provide full access to water supply and sanitation for all people. The United Nations, as part of its MDGs, has also set a target of halving the proportion of people without access to safe drinking water and basic sanitation by 2015 (WHO, 2004).

However, providing full access to safe drinking water and basic sanitation and increasing funding of these projects alone is not the solution. Sustaining long-term use and operation are important aspects which need serious

consideration. For example, at the conclusion of the 5 years, $135 million Indonesian Rural Water Supply and Sanitation Sector Project, fewer than half of the three million intended beneficiaries had received any services. In addition, only 30 – 40 percent of the water and sanitation facilities constructed was still functioning or in use 4 years after the project was completed.

Efforts in rural Africa had similar outcomes. Throughout the continent, of the 25000 hand pumps currently installed, less than 50 percent are estimated to be operational. This suggests that further understanding of the factors that lead to the adoption of sustaining interventions is critical for increasing access improving and achieving health gains (Montgomery & Menachem, 2007).

This chapter therefore, seeks to review relevant concepts on sustainable development and sustainability; water and sanitation, the various approaches to sustainability; some of the best practices in sustainability of facilities especially in water and sanitation facilities not leaving out the institutions responsible for water and sanitation and technical assistance and capacity building.

The concept of sustainable development

The World Commission on Environment and Development (WCED), otherwise known as the Brundtland Commission (1987) defines sustainable development as "economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs".

Sustainability can be seen to refer to the need for development to be

integrated, socially, economically and environmentally sound, oriented to the long-term, and hence, able to last (Centre for International Sustainable Development Law [CISDL], 2005). To some people, it describes the extent to which projects can lead to continuous growth and expansion in the economy accompanied by effective resource utilization and employment generation (Aradom, 1992). Valadez and Bamberger (n.d), also see it as "the capacity of a project to continue to deliver its intended benefits over an extended period of time". Sustainable development is "a process of change in which the exploitation or resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" (Burian, 2000).

"Sustainability" is the capacity to sustain a desired level of output of service for an extended period. It is ultimate test of development efforts. It requires not only that a particular project achieves its objectives during the project life but also that the benefits it generates continue beyond the time of the provider's involvement and continue despite technological changes (working definition).

Sustainability objectives

It is possible to set targets or objectives for the achievement of sustainability in practice. Ultimately the test of sustainability is whether facilities are functioning and being utilised. As means to this end, the functioning of community level caretakers and committees, including, especially, their revenue

collection activities, should be effective. The backstopping agency should continue to be visible to the community, carrying on its education and training, encouragement, and maintenance support role (Carter *et al.*, 1996).

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into the prevention of these diseases. The studies indicated that, depending on the type of disease and local circumstance the following preventive measures are particularly helpful in interrupting disease transmission: safe human hygiene, domestic hygiene (and animal management), food hygiene, water hygiene/consumption of safe water and safe water disposal and drainage. This suggests that improved water supply and sanitation facilities are important measures in preventing water and sanitation diseases.

History/Evolution of sustainable development as a policy concept

The concept of sustainable development even though used extensively since the mid 1980's, is not a new idea. The concept, contrary to popular perception, did not start with the publication of the report by the World Commission on Environment and Development (WCED). In the mid 1980's, well before this report publication, the concept of sustainable development had been popularized initially through the work of the United Nations Environment Programme (UNEP) and later on by the activities of the World Bank (Figueres, Torfajada & Rockstrom, 2003). Even though most of the concepts of sustainable development existed before the Commission's was published, appearing in 1987, its report started the process of making sustainable development an important issue on the world stage.

The commission presented and defined the phrase, sustainable development as "development that requires meeting the major needs of all and extending to all the opportunity to satisfy their aspirations for better life".

However, 'living standards that goes beyond the basic minimum are sustainable only if the consumption standards everywhere have regards for long- term sustainability" (WCED, 1987). Thus, sustainable development, as a concept, has two primary pillars; Economic development and the consumptive use of the world's natural resources in ways that are sustainable. Thus we have to consume, with the realization that resources are finite, and part of our job as human beings is to preserve the human future on this planet into a limitless future (Thomas Davis, n.d).

There are four types of sustainability. These are human, social, economic and environmental. Human sustainability means maintaining human capital. Human capital here constitutes the health, education, skills, knowledge leadership, and access to service.

Social sustainability means maintaining social capital. Social capital is the investment and services that create the basic framework for the society. It involves systematic community participation and strong civil society, including government involvement. Cohesion of community for mutual benefit, connectedness between groups of people, reciprocity, tolerance, commonly shared rules, laws, and information are factors that promote social sustainability.

The widely accepted definition of economic sustainability is maintenance of capital, or keeping capital intact. It mean consuming value added (interest), rather than capital. Investment in education, health and nutrition of individuals have become accepted as part of economic development which was originally seen as part of improving human sustainability (Goodland, 2002).

Environmental sustainability on the other hand is using natural resources in ways that are efficient. All these types of sustainability altogether work to achieve sustainable development, because they are interrelated and one cannot effectively work without the others. In this chapter however, economic and social aspects of sustainability would be closely looked at; in the sense that most of the time, there is lack of or inadequate funds to undertake sustainability of facilities. Considering the social aspects too, the attitudes of beneficiaries and service providers as well as recognised institutions established to oversee water and sanitation hinder the sustainability of the facilities.

Importance of sustainable development

The Agenda 21-principle 1, of the 1999 Earth Summit, states that "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature". Thus, it is important to ensure nature is sustained to meet the needs of people. Sustainability is important; in order to guarantee equity between current populations and future generations. Sustainability is important since projects have to continue to generate desired impact after their completion. Sustainable development also improves the well being of beneficiaries by providing facilities which can be maintained. This helps to eliminate the problem of reverting to unhealthy sources, especially in the case of water and sanitation.

Sustainable development can however not be fully attained without ensuring sustainability. The two concepts or issues go together. Since sustainable

development has at its centre, of meeting the needs of the current generation without undermining the ability of future generations to meet their own needs, there is the also the need to ensure sustainability of facilities to make sure that they provide their intended benefits to serve current needs and even kept well to serve future needs as well.

Determinants of sustainability

Performance indicators essential for evaluating any project's sustainability are as follows:

1. Generation and distribution of benefits; that is the ability of the project to produce and distribute its intended benefits to its beneficiaries.
2. Ability to maintain the flow of benefits, including competence of local or project beneficiary organizations; the project can be said to be sustainable when there is a continued flow of the expected benefits which can been enhanced through the competence and capacities of the beneficiary communities to maintain the projects after the providers have left.
3. Accountability and management relationship system to support mutually reinforcing project activities; where there is poor management system, accountability becomes a problem, leading eventually to less sustained projects. However, where there is a good management system in place, accountability to beneficiaries is ensured, thus increasing the level of sustainability.

4. Changes in quality of life of project beneficiaries; a sustainable project should able to bring changes in the quality of life of project beneficiaries especially health wise.
5. Continuity in the socioeconomic well-being of target population and ability to change; A project can be said to be sustainable when it able to improve and sustain the well-being of its target population and eventually reversing the situation for the better (Babu, 2008).

These performance indicators as identified above would help in finding out especially from beneficiaries how they have benefitted from a project, and whether or not the project's intended impacts are being realized, the changes that have occurred since the project's implication and also find out their competence to manage, operate and maintain facilities. This would be done through the administration of household and institutional questionnaires, which would give people the opportunity to express their views and concerns.

Factors influencing sustainability

Sustainability depends upon various interrelated factors, five sustainability factors that are common in development literature and the policies of international aid organizations are identified as socio-cultural respect, community participation, political cohesion, economic sustainability, and environmental sustainability (McConville & Mihelcic, 2007).

Socio-cultural Respect: This is one important aspect which needs to taken into consideration if sustainability is to be ensured. The social aspects and

cultural lives of project beneficiaries should never be taken for granted. In implementing projects sometimes, there are wrong assumptions about the needs and aspirations communities, their responses to the projects, labour availability and so on. However, the needs and priories beneficiaries should be taken into consideration since these, to large extent, determine use and sustainability.

Political Government Policy: Development projects operate within the context of national development policies and government's policy greatly influences sustainability. Government usually expresses its strong support for new projects in the course of planning, but during implementation often fails to provide adequate operational support, which result in cost and time overruns, thus affecting the ability of those projects to be well sustained.

Community Participation: Participation of beneficiaries in project planning, execution and management is very important in ensuring the projects sustainability. This is because more often than not, the operational responsibility of completed projects is left in the hands of people who either are less efficient or cannot manage or sustain the projects. This eventually leads to less inspiration to maintain the minimum level of performance since they are not involved much and hence do not see the project as their own. However, experience as shown that, where local participation is incorporated projects lasts longer, since beneficiaries see the projects as their own and hence take very good care of them.

Economic Sustainability: Sustainability depends on the flow of enough funds to cover operations, maintenance and depreciation of real assets, investment and continuation of project benefits. Most projects face critical problems related

to flow of funds mainly because of unreasonable pricing systems in place, lack of competitiveness, and ineffective supply systems. Generally, services are priced too low. However, projects must generate revenue adequate enough to justify continued government support in meeting annual operating costs of these projects. The risk of impact damage in installation, high cost of installation due to the need for special equipment as well as the efficiency of the service delivery system also determine the economic viability.

Environmental Sustainability: Another important factor in ensuring sustainability of projects is the environment in which they are found. Projects should be sited in environments which have favourable conditions to enhance their sustainability.

Sustainable development in Ghana

Emerging efforts to institutionalize the process of National Sustainable Development Strategies (NSDS) as a development management mechanism have been driven by developments in the international arena, including the Brutland report, Agenda 21, and, the World Summit on Sustainable development (WSSD). The emphasis of the NSDS is on seeking balance economic progress, social development and environmental management and other dimensions for sustainable development (European Commission, 2004). Ghana has been engaged in several strategy policy processes in efforts to achieve poverty reduction and sustainable development as a result of the emphasis placed on sustainable development by the Brutland report of 1987.

Ghana's pursuit of sustainable development has been shaped or informed by its decentralization policy. This is a shift in the approach to development programming towards increasing community or local participation. Since the inception of the current system of local government based on the policy of decentralization in 1988, the process has involved a re-definition of the relative roles and structures of government at the national, regional and local levels by allocating policy making to the centre, coordination to the regional level, and implementation to the local level. Decentralization has covered several reforms centring on political, fiscal and administrative decentralization coupled with decentralization planning and management of public –private partnerships (Vordzorgbe, 2005).

Decentralization gives people at the grassroots level, the opportunity to take part in decisions that affect their lives. This enables them to take control of affairs and manage them in ways which ensure sustainable development. The thematic focus of sustainable development strategy processes/frameworks proposes eight principles of sustainable development that illustrate the broad thematic areas of focus or objectives of strategies for sustainable development applicable to Ghana. These grand objectives represent a set of human and societal values that NSDS should aspire to. Progress towards achieving the objectives will ensure movement towards sustainability of development efforts in Ghana. The proposed key principles and broad objectives of sustainable development of Ghana are; nurturing a conducive enabling milieu, meeting basic needs and developing a better quality of life for present and future generations, managing

natural resources sustainably, promoting safe development within a caring society, targeting effective participation of stakeholders, basing development on science and technology and pursuing internationally responsive development (Vordzorgbe, 2005).

These proposed principles will holistically promote social, economic and environment developments which constitute sustainable development.

Approaches to sustainability in Ghana

The Demand Responsive Approach

Experience has shown that supply driven approach to water and sanitation delivery in the past have not ensured sustainability of the facilities. The new approach to provision of facilities and services is based on the demand responsive approach. The approach enables District Assemblies to obtain full commitment of beneficiary communities to sustain delivered facilities which conform to the tenets of Ghana's development strategy which aims at empowerment, decentralization of governance to local levels, effective participation and the reduction of rural poverty (CWSA, 2004).

The Adaptive approach to sustainability involves encouraging learning, innovation, participatory monitoring and evaluation, and impact assessments, especially in areas such as the full participation of women at all levels of the program; application of lower cost technology and service level options; effective hygiene promotion and training; sustainable supply chains of goods and services and especially spare parts at the local level; targeting areas that have lower

coverage; and increasing the role of communities in decision – making, service financing and implementation.

Community management approach

The community management approach and ownership and elicits significant private sector involvement with public sector agencies playing facilitation roles. Key features of community ownership and management include the communities;

- Having legal ownership and control of the services, including formal agreements with the project agency;
- Selecting the level of service it requires, can afford, and can sustain with human and financial means;
- Selecting the site for water points;
- Contributing real (not token) cash of between five and 10 percent to the capital cost of facilities;
- Setting up a committee or board that is accountable for managing the project;
- Accepting complete responsibility for operation and maintenance of the water systems, including collection, management, and safekeeping of funds and purchasing the goods and services required for maintaining the system;
- Appointing its own caretakers to receive training and tools and be responsible for preventive and simple corrective maintenance; and

- Being ready to undertake self-help action to assist with repairs, cleaning, and maintenance of the area around the water projects (Karikari, 2004).

The decentralized approach adopted by Ghana has brought safe water and improved issues to the fore for the planning, implementation and management of sanitation as both economic and social goods which must be used in a more prudent way. This arrangement helps in the sustainable utilization and management of water resources and services. By decentralizing the delivery arrangement for safe water and improved sanitation services, the poor and vulnerable in Ghana, many of whom are found in the rural communities, are provided with good drinking water which immensely contributes to improving on their living conditions by enhancing their production and productivity (Sarkodie, 2003).

Success or failure of a system primarily depends on one factor; whether the system is sustainable or not. And for the sustainability of a system, the use and maintenance has to be done by the community. This can only come when the community participates at all stages of the project.

Global water supply management situation

According to Al-Jayyousi (2001) it is evident that water management brings with it the reality that the world has come a global village. Insight into water management might be gained by looking at three different levels: the local level, where operations are carried out; the regional level where policies are made; and the global level where funding and external supports are generated.

However, there is evidence that global water institutions such as the United Nations have experienced some constraints while implementing global water goals. International efforts in water management – from the United Nations Water Conference in Mar del Plata in 1977 to the International Conference on Water and Environment in Dublin and the Earth Summit in Rio de Janeiro, both in 1992 and later the World Water Vision – may be described as converging activities without a unifying organization.

The last two decades have two major lessons in water management. Firstly, water was recognized as only one of a number of natural resource elements that needs to be managed in a sustainable manner. Secondly, there is the realization that water resources development is not attained by only supplying physical infrastructure. A new shift in thinking has taken place by changing infrastructure from supply oriented – supply of facilities to communities who will, one day, become consumers – to demand oriented by focusing more on adequate assistance and the development of local capacity (Figueres, Torfajada & Rockstrom, 2003).

The indicators of success in implementing global agenda in water management are judged on impact, benefits and outcomes at global, regional, national and local levels. Applying global goals to the national or local levels has the ability of yielding interesting results. At both the global and local levels, the future of water management will be shaped by raising the 'civic intelligence' concerning how water should be valued and managed; and promoting the notion that water is a human right which is vital to the provision of water for the poor. It

is also crucial to identify enabling factors such as sound water institutions and laws and the change agents such as NGOs, who build bridges between water stakeholders at global, regional and local arenas (Figueres, Torfajada & Rockstrom, 2003).

National water supply and management in Ghana

Water supply and sanitation infrastructure in Ghana is insufficient, especially in rural areas and concerning sanitation. According to the Joint Monitoring Program for Water Supply and Sanitation of UNICEF and WHO, 88 percent of urban population have access to water while rural access is 46 percent. With sanitation, 27 percent of urban population have access while 11 percent of rural population have access (McConville & Mihelcic, 2007). Water, sanitation and hygiene are vital components of sustainable development and the alleviation of poverty.

Over the past decade, some initiatives have been undertaken to address some of the problems that constrain the sustainable development and management of the country's water resources, particularly to restructure the role, functions and decision making processes within the water sector. These included water sector reforms coordination of national water resources management and strengthening of Water Resources Information and Development Agencies (Ministry of Water Resources, Works and Housing [MWRWH], 2005).

Water supply and sanitation policy in Ghana

The Environmental Sanitation Policy of 1999 provides the framework for waste management in Ghana. Metropolitan/Municipal/District Assemblies have been tasked with the responsibility of regulating, planning and management of waste disposal. Metropolitan and Municipal Assemblies under the Local Government Act, 1993 (462) are to establish Waste Management Department. Environmental Health Units operating within the Works Department of the District Assemblies have been entrusted with the task of managing waste in the districts (MWRWH, 2005).

Present drinking water policies assume that rural drinking water supply facilities, such as, improved hand dug wells or hand pump fitted boreholes can and should be best managed by local water user communities. It is expected that "communal management" will guarantee the technical sustainability of the supply facilities as well as more equal access to water. Ghana like many other African countries has adopted and implemented this approach country wide in its National Community Water and Sanitation Program (NCWSP) from 1998 (Eguavoen, 2006).

The new policy introduced in 1993 aims at ensuring sustainability of the water and sanitation facilities provided through a demand responsive approach and a shift from the dependence on government towards greater self-reliance by user communities. For rural areas the policy is provision of services through community participation in terms of ownership and management of the facilities. For the sanitation sub-sector the policy is towards simple sewerage systems for

urban areas and single household type dry on-site systems for rural areas and small towns (Wikipedia, 2008).

At the moment, a number of institutions exist to supervise and regulate water supply and sanitation. These are the Water Directorate within the Ministry of Water Resources, Works and Housing (MWRWH), the Ministry of Local Government and Rural Development which shares the responsibility of setting sanitation policies and coordinating funding for the subsector with MWRWH, the Metropolitan, Municipal, and District Assemblies which are decentralized institutions, and the Environmental Protestation Agency (EPA) under the Ministry of Environment and Science expected to examine the impact of sanitation development activities on the environment.

To overcome the lack of coordination between the numerous institutions which were created since 1993, the National Water Policy (NWP) was launched at the end of February 2008, which focuses on the three strategies areas; water resources management, urban water supply and community water and sanitation. The NWP thus aims to formulate comprehensive sector policy which includes all relevant actors in the sector (Wikipedia, 2008).

Sanitation management status in Ghana

Sanitation is the collection and disposal of sewage and garbage or they are the conditions or procedures related to the collection and disposal of sewage and garbage, with particular emphasis on the collection and transportation procedures (working definition).

The lack of adequate sanitary infrastructure and inadequate financial resources, coupled with rapid rates of urban population growth have led to inefficient and thus sustainable sanitary provision and waste disposal mechanisms in most urban areas of the less developed countries. The repercussions of poor sanitation and waste management practices are poor health. Sanitation inadequacies contribute to seventy percent of diseases in Ghana. The Ghanaian has begun to increase its focus on the status of sanitation within the country. The majority of sanitation concerns are focused on water and proper solid waste disposal (Southern Links, 2002).

In planning waste management, it is important to know how waste is generated, transported, treated and or disposed of. Waste can generally be classified under four types which are:

- Solid waste – waste generated from households, markets, parks, industries, health institutions.
- Liquid – waste generated from WC septic tanks, pit latrines, aqua privies and night soil
- Sullage - waste generated from Kitchen, bathrooms, Chop bars, and water from drainage.
- Industrial – chemical, ferrous and non – ferrous metal, cyanide, pesticides, oil residence, etc.

In Ghana, the first point of waste management is at the generation level and the role of the citizenry and community is also crucial in determining the level of service. The two main collection options available for solid collection

are:

- On-Premise Storage System: this is where containers are in the premises of the households and collected at regular intervals and
- Central container System: in this system, high capacity containers are located at vantage points in the communities into which households dump their waste.

The various technology for transporting solid waste include the Multi – Lift and Arm – Roll and the Rear – loading Compactor trucks the most modern vehicles waste collection.

Appropriate and low cost disposal option for the treatment and disposal of liquid waste include:

a) Soak Away: This is the appropriate and low cost disposal options for sullage at the District level. Primary and secondary roadside drains also help to drain soak – aways from houses.

b) Stabilization Ponds: This is suitable for the treatment of liquid waste from Water Closets, KVIPs and VIPs. Stabilization ponds are low cost and capable of meeting EPA's effluent standard for the treatment of larger quantities of excreta and septage.

The community water and sanitation agency

The Community Water and Sanitation Agency (CWSA) is a statutory body (established by Act 564 of 1998) charged with facilitation and management of the national strategy for community water and sanitation delivery throughout

the country. The CWSA is highly decentralized with multidisciplinary staffing located in the 10 regions in Ghana. The regional teams of CWSA directly support the District Assemblies to plan, implement and manage safe water and related sanitation services. The CWSA is a semi-autonomous division of the Ghana Water and Sewerage Corporation (GWSC), created to cater for the activities of the rural population of the country.

The Community Water and Sanitation Agency (CWSA) is in charge of coordinating and facilitating the implementation of the National Community Water and Sanitation Programme (NCWSP) in rural areas, which is carried out directly by the communities and their District Assemblies.

Functions of CWSA

The Act, (Act 564), 1988 establishing the CWSA detail out the main functions of the Agency as follows:

a. Provide support to District Assemblies to:
   - Promote the sustainability of safe water supply and related sanitation services in rural communities and small towns; and
   - Enable the Assemblies encourage the active involvement of the communities, especially women in the design, planning, construction and community management of project related to safe water supply and related sanitation services.

b. Formulate strategies for the effective mobilization of resources for the execution of safe water development and related sanitation programmes in rural communities and small towns.

c. Encourage private sector participation in the provision of safe water supply and related sanitation services in rural communities and small towns.

d. Provide District Assemblies with technical assistance in the planning and execution of water development and sanitation projects in the Districts.

e. Assist and co-ordinate with Non – government Organization engaged in:

- The development of rural community and small town water supply and the provision of sanitation facilities and hygiene education in the country

f. Initiate and pursue in collaboration with the Ministry of Local Government, Environment, Health and Education, formal and non – formal education programmes for the creation of public awareness in rural communities and small towns of water related hazards.

g. Prescribe standards and guidelines for safe water supply and provision of related sanitation services in rural communities and small towns and support District Assemblies to ensure compliance by the suppliers of the services.

h. Charge reasonable fees for the services provided

i. Collaborate with such international agencies as the agency considers necessary for the purposes of this Act and

j. Perform any other functions assigned to it under the Act (CWSA, 2004).

Adopted theories of sustainable water and sanitation development

A number of institutions are now seeking to create conceptual models and paradigms to encapsulate the Water and Sanitation (WATSAN) sector and its workings in an effort to come to grips with what it is that needs to be taken into account for successful WATSAN intervention. Here, with some analysis, are three of them.

- **The building blocks model**

Harvey and Reed (2004) in their book Rural Water Supply in Africa, refer to building blocks required for achieving sustainability. These they consider to be:

- the policy context
- institutional arrangements
- financial and economic issues
- community and social aspects
- technology and the natural environment
- spare parts supply
- maintenance systems
- monitoring

The importance of taking a holistic approach that addresses all the sustainability factors and the relationships between them, and propose the analogy of a wall built out of all the building blocks.

- **The "Carter Paradigm"**

It is suggested that these building blocks, while important, are not the whole story of what leads to sustained beneficial outcomes in WATSAN interventions. According to Carter (2004) there are other things, including quality, process, integration and ethos, which are of as much importance as the building blocks envisaged by Harvey and Reed. These five pointers to sustainable development, presented here as the "Carter Paradigm", could become a simple and effective tool for analysing success and failure in WATSAN programmes (see Fig.1 below) by addressing not just Harvey and Reed's (2004) building blocks, but the ways they are applied.

Thus not only were the right things done, (the building blocks), but were they done well (the quality). Was there necessary attention made to culture, trust and partnership (the process)? Are vision, attitudes and values of staff and community cultivated and taken into account (ethos)? And is the whole lot coordinated effectively (integration)? It may seem obvious that quality, or doing a job well, is essential, but how many projects have failed in the developing world because not enough attention was paid to the quality of implementation? Likewise it is the process of paying attention to culture, trust and partnership that can ensure not only appropriate strategies are used in communities, but that the teams themselves learn to respect one another's abilities and strengths and work effectively together.

The integration of institutions and departments allows staff to coordinate and work more effectively than they could have done on their own. With a range

of different disciplines and skills available, the effectiveness of the integrated team becomes greater than the sum of its parts. Ethos, perhaps the most difficult of these dimensions of sustainability to assess, is expressed as vision, attitudes and values, and as with process, it is both important for beneficiaries and staff, though in different ways.

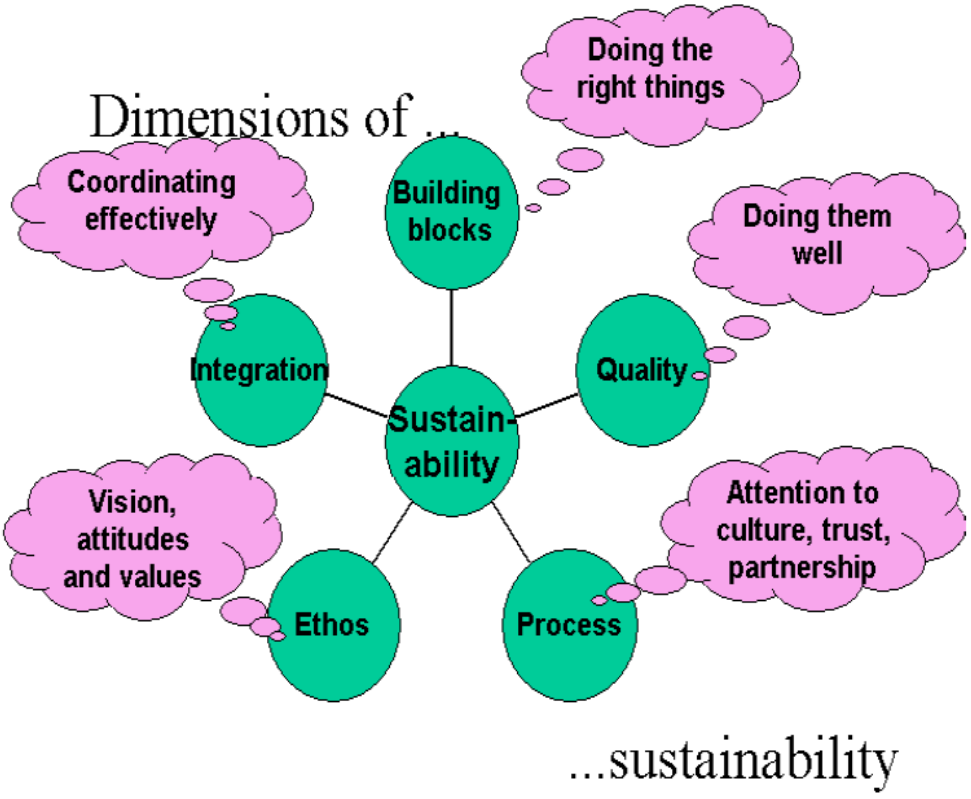

Figure 1: The Carter Paradigm (2004)

Source: Field Survey, 2006

- **Bridge to sustainable development**

Another analogy may be to incorporate Carter's dimensions of quality, process, ethos and integration along with the original Harvey and Reed's building blocks (now referred to as project elements) into a new building block model (Fig.

2.). These building blocks form the arch work of a bridge. The bridge itself provides support for a road, along which people deprived of safe water and adequate sanitation (and their governments) can travel to achieve sustained beneficial outcomes, thereby avoiding the threats to sustainable development symbolised by the river. The building blocks in the arch are all dependent on each other. If one is taken away, this will lead to the collapse of the arch and the destruction of the bridge (IRC, 2005).

Either way the analogy itself is unimportant. What is important, however, is that all these aspects are included and provided for in project design, implementation and long-term support (IRC, 2005).

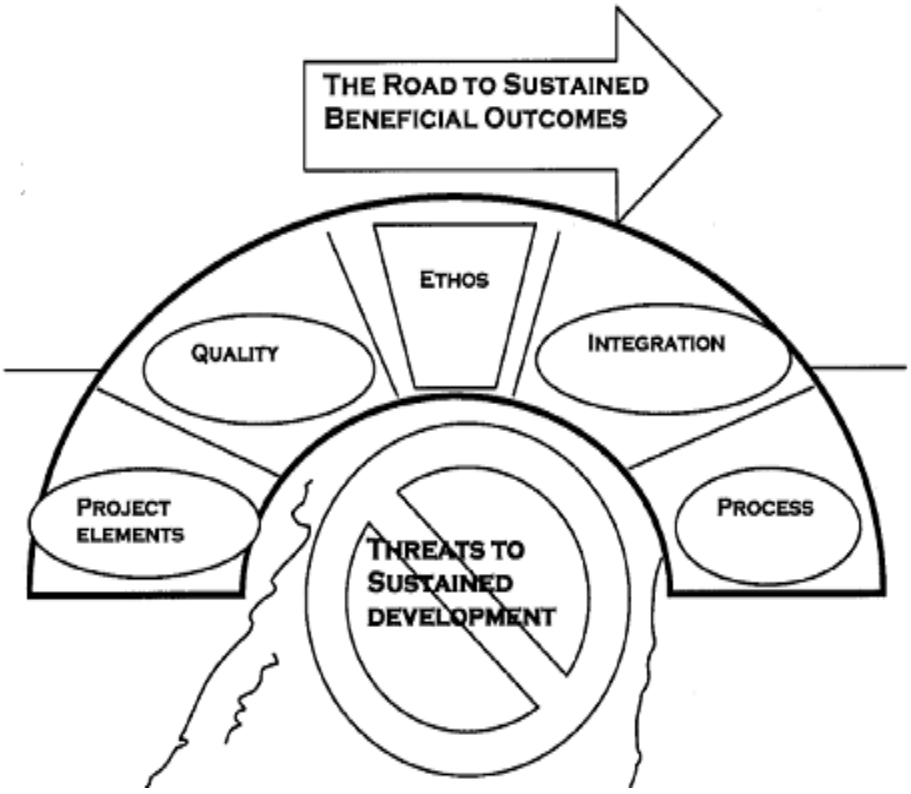

Figure 2: The "bridge" to sustained beneficial outcomes (IRC, 2005)

Source: Field Survey, 2006

The nature of technical assistance in sustainable community water and sanitation development

As in many developing countries, various external donors provide much of the financing for capital investments in rural water supply projects in the different regions of Ghana. Since 1995, the Ghanaian Community Water and Sanitation Agency (CWSA) has been responsible for the coordination and facilitation of activities in the sector. CWSA's national strategy promotes a "demand-driven" planning approach that emphasizes participatory project design and implementation. The rural water supply projects are expected to include consultation with communities about relevant technology and management choices, and the participation of women is valued and encouraged. Once the projects are built, district assemblies hold the water systems in trust for the communities, and communities are encouraged to establish water and sanitation ("WATSAN") committees to manage the systems. Project implementation is expected to include initial training to these committees and special training on repair and maintenance to two village-based "caretakers" who are generally members of the WATSAN committee (Edig *et al*. 2002).

Once boreholes and handpumps are installed, communities are expected to be responsible for borehole maintenance and repairs. The WATSAN committees and caretakers have access to a well-developed, multifaceted system of post-construction support. A central actor in the post-construction support system is the District Water and Sanitation Team (DWST), consisting of an engineer, a hygiene expert, and a community mobilizer seconded to the district government.

DWST members are not supposed to do handpump repairs themselves, rather to help the village watsan committees obtain the support and training they need to run and repair the systems, to help resolve any management and water use conflicts that arise, and to plan new capital projects. The DWSTs visit WATSAN committees on request, and assist communities in finding spare parts if asked to do so. They also visit some communities on their own initiative to check on conditions and organize training sessions on topics they consider to be relevant. However, the financial resources available to the DWSTs to carry out these functions are limited and vary across districts. How much attention a village receives from a DWST is dependent on both how pro-active the village is in requesting assistance and on the resources and priorities of the district-level team (Whittington, Davis, Prokopy, Komives, Thorsten, Lukas, Bakalian and Wakeman, 2007).

Another important resource for WATSAN committees are the "area mechanics" living in the district. These are private individuals originally trained during the project implementation process to do routine maintenance or repair work on boreholes at the request of communities. Area mechanics are frequently called upon to obtain the spare parts needed by the community and then to install these parts. Communities must pay for the services of the area mechanics from revenues collected from village households or money obtained in some other way. The DWSTs may help WATSAN committees link up with an area mechanic when major repairs are needed (Edig *et al*., 2002).

The services provided by the area mechanics and the spare parts outlets are largely demand-driven in the form of post-construction support (PCS), in the sense that communities receive them if they request or seek assistance. Communities pay for the services of the area mechanics and for the spare parts. The work of the DWSTs is also largely demand-driven assistance (responses to community requests), though some villages also receive unrequested support. Ghana has one official PCS program (in the DANIDA operating regions) that is not linked to demand for PCS services; MOM (Monitoring of Operations and Maintenance). This is a program of quarterly visits to communities by the district Environmental Health Assistants (EHAs). During their visits, the EHAs do a technical assessment to determine how well the boreholes are functioning, review financial records, and check on payment practices. The records of these quarterly audits are compiled at the district level, in theory giving district-level officers a systematic picture of what is happening in the district (Komives *et al*., 2007).

In 2002 and 2003, the Danish aid agency DANIDA funded the monitoring of operations and maintenance in the Volta region. Since 2004, the responsibility for the program has fallen to the district governments in Volta. Only four districts continued the MOM audits on a quarterly basis after the program. It reverted from DANIDA back to the district governments. Other districts have reduced the frequency of these EHA visits due to resource constraints. Next to these government-provided PCS systems exists a series of less-systematic forms of post-construction support provided by a myriad of different actors. Some villages receive grants to fund repairs or new boreholes through Members of Parliament,

ethnic organizations, or private companies active in the villages. Others have enjoyed free handpump repairs provided by the NGOs. Contrary to PCS protocol in Ghana, DWST officials and area mechanics have also repaired handpumps for free on occasion (Komives *et al*., 2007).

Empirical review

The empirical review will review case study from other related works on the best practices in sustainably managed water and sanitation project.

A case study of Indonesia

In Indonesia, there are two different project approaches that the government has been using to provide clean and drinking water to urban and rural communities. Firstly, a community development approach for rural and urban poor called Energy Subsidy for Drinking Water Project (SE – AB). The community is responsible for planning, implementing, and operating the facilities. Infrastructure investment is made by the government whiles the operation and maintenance costs are collected by the community through a water tariff. Secondly, privatization of urban drinking water services particularly for the customers who are able to pay a water tariff. Tariff is based on full cost recovery in which all costs incurred in the project, that is; investment costs, as well as operating expenses and depreciation are fully covered. The project is being carried out by, among others, Urban Water Supply and Sanitation, World Bank Assisted Project, and Institution Development Project, and ADB. The World

Bank assistance will focus on Water Supply Enterprise's Assets Optimization and Extension of Supply Coverage to maintain financial balance sheet and improve credit worthiness. Agriculture Development Bank (ADB)'s assisted project deals with the development of a trust fund to enable the water supply enterprise to borrow capital investment and establish a Regulatory Body to manage water supplies.

Many schemes of water supply, sanitation and settlements programme in the areas using demand responsive approach through participatory process and private engagement show a better sustainable infrastructure management compare to the areas which still used supply driven approach. The most important impact is coverage expansion of water and sanitation for low income people who have difficulties to access safe water and better sanitation facilities especially in rural, remote and urban slum area (UN Department of Economic and Social Affairs, 2008).

Summary

The literature review has revealed a lot of important issues concerning the water and sanitation projects or facilities and ways through which they can be well managed and sustained.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter outlines the research methods used to conduct this study with the aim of achieving the research objectives. It presents the research design and provides details regarding the study area, target population, sample size, sampling techniques and procedures. It also describes the research instrument, the data sources and data collection methods. Finally, it discusses ethical concerns and data handling and methods of data analysis.

Research design

The study employed mixed method research to assess water and sanitation systems in the Ejisu-Juabeng Municipality. The rationale for using the mixed method research is to draw from the strengths and minimise the weaknesses of both qualitative and quantitative methods and thereby enrich the research results. The importance of using both quantitative and qualitative strategies is also under scored by Yin (1994), who stipulates that the rationale for using multiple sources of data is to triangulate evidence in order to increase the reliability of the data and the process of gathering it and hence corroborate the data gathered from different sources. Deacon, Bryman and Fenton (1998) point out that the combination of

qualitative and quantitative design strategy enables cross checking of validity of findings from different research strategies as well as allowing access to different levels of reality thereby enhancing induction of meaning from the findings. In using the mixed method strategy, the concurrent approach was employed. That is, the researcher merged the quantitative and qualitative data collected in order to provide a comprehensive analysis of the research problem.

Study area

Ejisu–Juabeng Municipality is one of the twenty six political and administrative districts of the Ashanti Region with Ejisu as its capital. It was formerly, a District, but was upgraded to a Municipal status by an Executive Instrument in 2007 and formally inaugurated in February 2008. The Municipality is known for its rich cultural heritage and vibrant kente weaving industry.

The Municipality stretches over an area of 637.3km2 constituting about 10 percent of the entire Ashanti Region and with Ejisu as its capital. It is located in the central part of the Ashanti Region and lies within Latitude 1^0 15' N and 1^0 45' N and Longitude 6^0 15'W and 7^0 00'W.

It shares boundaries with six other Districts in the region. To the North East and North West of the Municipality are Sekyere East and Kwabre Districts respectively, to the South with Bosomtwe-Atwima and Asante-Akim South Districts, to the East with the Asante-Akim North Municipality and to the West with the Kumasi Metropolitan (www.ghanadistricts.com/districts).

Population size and growth rate

According to the 2000 populations and Housing Census, the population of the District stood at 124,176. In 1984, the population stood at 83,465. The increase in the size of the population in 2000 gives a growth rate of 2.5 percent as compared with the regional and the national population growth rates of 3.4 percent and 2.7 percent respectively.

It is attributed to the fact that the Municipality is noted for peri-urban nature of its settlements. Therefore, people looking for low accommodation migrate to these areas. The natural increase figure for the district is 15 as against the natural figure of 15 (Source: Population Reference Bureau/ Data Finder – Ghana, 2004). This figure being positive has the tendency to cause a steady rise in the population of the Municipality with time. It implies that there is the need to provide more infrastructure to serve the growing population

Relief and drainage

The Municipality falls within the forest dissected plateau terrain region. This region is underlain by the pre-Cambrian rocks of the Birimian and Tarkwaian formations. It rises from about 240 meters to 300 meters above sea level. The area is generally undulating and is drained by a number of rivers, notable among them being Oda, Anum, Bankro, Hwere and Baffoe. This serves as sources of water for the communities where they drain.

In the rainy season, occasional flooding is experience in the inland valleys along the river basins. This causes environmental problems in the built

environment creating gullies in certain parts of the Municipality. Examples of some eroded communities include Besease, Kokobra, Kwaso and Ejisu among others (www.ghanadistricts.com/districts).

Water and sanitation

The major sources of water in the Municipality are pipe borne, rivers and boreholes. The types of toilet facility used in the Municipality include VIPs, pit latrines, water closets, aqua privy, septic tank latrines and free range.

Good water sources, without good hygienic practices, alone cannot achieve the goal of having or reducing the number of people without good access to safe water and sanitation. There is, therefore, the need to gear greater attention to the issue of sanitation too. Sanitation here captures solid waste collection and disposal, and liquid waste disposal.

Population of the study

The population is the group of people the researcher is interested in studying. The study population in this study was household members, members of institutions and other committees related to water and sanitation in the Ejisu-Juabeng Municipality.

Sampling and sampling procedure

A multi-stage sampling procedure was used to select the sampling units for this study. The sampling units included households, institutions and other

committees related to water and sanitation.

The Ejisu-Juabeng Municipality was stratified into three (3) strata. One community was selected in each stratum based on purposive sampling. These communities were Ejisu, Deduako and Buamadumasi. The rationale for using purposive sampling was to enable the researcher to select cases that are especially informative. These communities were chosen because of their size and the heterogeneous nature of the population in order to ensure that the sample is representative of the entire population of the study area.

The listing of all the households in each community was done and a total of 17 households were selected from each community using systematic sampling technique. Hence, a total of 51 households were systematically selected across the three communities.

From the randomly selected households, a listing of all the members of the households was done and one eligible respondent was randomly selected for the interview. Eligibility was based on age and concerned about water and sanitation problems in the community. In a situation where there was more than one eligible respondent in the selected household, simple random sampling was used to select the respondent that was interviewed. However, if there was no eligible respondent in the selected household, the next household was selected from the same community. The reason for using systematic and simple random sampling was to give all the respondents equal chance of being selected and to enhance the representation of other variables related to them, thus reducing sampling error.

Purposive sampling was used to select key individuals from the WATSAN

Committees and Department of Waste Management in the Municipality. This technique was used because it gave the researcher the opportunity to select people directly involved in water and sanitation issues.

Sample size

In all, 100 household members were interviewed across the 51 selected households in the communities understudy. These were distributed as follows: Ejisu 40, Deduako 30 and Buamadumasi 30. The sample size of 100 was small for the kind of study intended, but time and financial resource constraints made it imperative to restrict the sample to that size.

Instrumentation

An Interview Schedule tagged: "Assessment of Community Water and Sanitation Programmes" was constructed by the researcher. The interview schedules were administered to household members. Interview Schedules gave the respondents freedom to decide the detail and the length of his/her answer. It enabled the respondents to give a more adequate presentation of his/her particular case and convey flexibility in his choice.

This Interview Schedule was conceptually grouped into two major sections. The first part is based on the demographic characteristics of respondents such as age, sex, marital status, occupation, educational level, etc. The second section looks at the measures that have been put in place to ensure sustainability; sources of funding for the provision of facilities; level of participation of

beneficiary communities in the provision of these facilities and the funds, competence and technological capacity of personnel or people to maintain facilities. Two additional Interview Schedules were designed to collect data from WATSAN Committees and Department of Waste Management in the Municipality.

Pre-testing of tools

The Interview Schedules developed by the researcher were pre-tested in communities which were not included in the study to observe if it is understood by the respondents. Debriefing was done to ask the respondents understanding of questions that appeared to cause difficulty during the interview. Questions were adjusted according to the pre-test results in order to achieve better clarity.

Sources of data

The study used both primary and secondary data. The secondary data was obtained from other sources such as the Medium Term Development Plan (MLGRDE, 2006 that all district assemblies are obligated by Act 462 to prepare), articles, journals, which were relevant to the study, past research work, dissertation and thesis containing the necessary data relevant to the study.

Primary data was gathered through household surveys using interview schedules and unstructured interviews with key individuals from the WATSAN Committees and Department of Waste Management in the Municipality.

Data collection procedure

A research assistant who is well conversant with the local languages was identified and trained to administer the interview schedule and help with data collection. The researcher and the assistant visited households. The researcher and the assistant did a more detailed introduction of the study, highlighting its purpose, as part of seeking verbal informed consent. The voluntary nature of participation was also highlighted in the process. Any respondent who was willing to participate following a solicitation in face-to-face contact was included in the sample. Those who were unwilling to participate were excluded. The process of data collection continued until every effort to contact every study participant in the sample had been exhausted.

At the convenience of participants, instrument administration happened immediately following consent or at a later time. All the interviews took place in spaces that participants felt comfortable to respond to the questions.

Face-to-face interview was used to collect data. The high rate of illiteracy among the respondents justified the use of the face-to-face interview method. Thus, the method enabled the researcher and his assistant to provide clarification on items in the interview schedules. In addition, the face-to-face interview method enabled the researcher and the assistant to translate items into local language for the respondents, which ensured good cooperation from respondents. In a nutshell, the face-to-face interview method enabled the researcher to probe further into pertinent issues not captured by the instrument.

Unstructured interviews, observation and study visits: Further data on

water and sanitation systems in the Municipality were collected through unstructured interviews with key individuals from the WATSAN Committees and Department of Waste Management in the Municipality. Additionally, personal observation and study visits were made to the water facilities, solid waste facilities, toilet facilities and liquid waste (water) disposal sites in the communities to ascertain their status.

Data handling and analysis

After data collection, interview schedules were compiled. Field editing was done to check for errors, eliminate mistakes, making sure the responses were coded accordingly to make certain all the responses were filled so as to prevent missing data. All the questionnaires were successfully retrieved, thereby yielding a response rate of 100 per cent. Data was sorted, coded and entered into the computer using statistical software, Statistical Product for the Service Solutions (SPSS) which was used for data entry. Descriptive statistics such as frequency distribution, percentages and cross-tabulation was used to describe and summarize the data.

The qualitative data was analysed manually, and this involved sorting out notes and transcripts into the broad topics or sub-topics used in the research, or adding any new themes that emerged from the interviews. This procedure ensured that "scattered pieces of data" on the same sub-topic were put together for a complete review. The aim was to provide some coherence and structure to the data while holding on to the original accounts and observations.

Summary

This chapter described the research methodology that the researcher used to generate data for this study. The chapter commenced with a description of the study design and provides details regarding the study area. The target and the study population were identified, followed by an elucidation of the sampling techniques and procedures used to select participants. The development of the study instrument was discussed. Steps and procedures of data collection were also clearly described. Data collection methods and data collection processes were clearly explained. Finally, data handling and analysis procedures were outlined. In the next chapter, the results of the study would be presented.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter is divided into two sections: results and discussion. The results section is devoted to the analysis of the data collected from the field survey. Each set of data was juxtaposed with the specific research question it sought to answer for analysis. The data is classified into water and sanitation issues and analyzed according to households and then institutions. Descriptive statistics such as frequency distribution and percentages are used to clarify issues where applicable.

Demographic characteristics of respondents

This section presents respondents' demographics such as sex, age and educational level.

Sex and Age distribution of respondents

The sex and age of respondents are depicted in Table 1. The data show that out of the 100 respondents canvassed, there were 40 (40.0%) males and 60 (60.0%) females. There was a higher proportion of females. This shows that the communities are predominantly women. In addition, respondents aged 21 to 25

years were 12 percent while the predominant 44 percent were aged 26 to 30 years. The distribution further shows that 24 percent were in the 31-40 age groups while 20 percent were in the 41 plus age category.

Table 1: Sex and Age distribution of respondents

Characteristic	Frequency (n=100)	Percentage
Sex		
Male	40	40.0
Female	60	60.0
Age in years		
21-25	12	12.0
26-30	44	44.0
31-40	24	24.0
41 & above	20	20.0

Source: Field survey, 2006

Educational status of respondent

It was also necessary for the study to determine the educational levels of the respondents. If the education level in a particular country or district is low, then the implementation of sanitation programmes will be very difficult, because the people would not be able to maintain the facilities and understand the policy

of the government. Education is one of the programmes of the water and sanitation problems in Ghana and specifically Ejisu–Juabeng Municipality. This is shown in Table 2.

Table 2: Educational status of respondents

Educational level	Frequency	Percentage
No formal education	30	30.0
Primary	25	25.0
Basic	15	15.0
Secondary	12	12.0
Tertiary	18	18.0
Total	100	100.0

Source: Field survey, 2006

Table 2 depicts the educational status of respondent. Out of the 100 respondents, 12 percent and 15 percent had secondary and basic education respectively. Only 18 percent had tertiary education. As much as 25 percent had only primary education while the majority 30 percent had little or no education.

Water facilities and responsibility for sustainability

- Sources of water supply

The major sources of water supply in Ejisu are boreholes and hand-dug

wells. As the survey revealed, 58 respondents representing 69.9 percent got their major sources of water from boreholes, 25 respondents representing 30.1 percent had their water from hand-dug wells. This is because of the lack of pipe borne water for over the past twenty years from the Ghana Water Company Limited. This problem is associated with the rapid population growth in the community as well as that of surrounding cities like Kumasi, and the lack of a booster station where water can be pumped to reach the town. This explains for the major sources of water in the community. However, people in the community have access to good sources of water.

Water is one commodity that is not a problem in the community of Deduako. It is well endowed with water facilities including four boreholes situated in four vantage places in the community. Thus, the whole community rely on these boreholes for their main sources of water.

The situation in Boamadumase is not too different from the other two communities. The people depend mainly on two boreholes, hand-dug well and the Bankoro River for their water supply. The types of water resources and percentages of usage is shown on Table 3.

In Ejisu, most households more than a third (36.1%) patronized their sources because of its good quality, 21.7 percent also patronized because it is their only source or close to them. However, 13.3 percent did patronize because it is close to them and serve as their only source of water.

Table 3: Major sources of water

Community	Types of Source	Number of People	Percentage
Ejisu	Boreholes	58	69.9
	Hand-dug Wells	25	30.1
Deduako	Boreholes	6	100
Boamadumasi	Boreholes, Hand-dug and River	10	100

Source: Field Survey, 2006

About 14.5 percent also did so because of its proximity to them and its good quality and the fact that the sources are good quality and it is their only source of water. Lastly, 4.8 percent did patronize because of all the above mentioned reasons, in addition to the fact that these sources are very reliable. This implies that people would have chosen other sources if they were available to them for different reasons.

However, in the remaining two communities Deduako and Boamadumase, respectively, people patronized their sources because they were their only source and some especially the boreholes were of good quality.

Issues on who owned or provided a particular facility and how long they have been in place were raised in order to find out whether ownership had any impact on the sustainability of these facilities.

As the survey revealed in Table 4, about 59 percent of these sources or facilities have probably been in existence between 1-5 years, with 25.3 percent being between 5-10 years and the remaining 15.7 percent being over ten years old. Majority of the sources, 72.3 percent are privately owned, accounting for the high number of sources being established in the past five years. It was also realized that the sources that were over ten years old (23%) were mostly hand-dug wells and self-owned, as these were major before the advent of private operators, which is purposely for profit gains. The remaining 3.6 percent and 1.2 percent were Municipal Assembly and community provisions respectively. The situations as pertained in the three communities are shown in Table 4.

Table 4: Ownership of water facilities

Community	Ownership	Existence (in years)	Percentage
	Private	1-5	72.3
Ejisu	Self	Over 10	23
	Municipal Assembly	1-5	3.6
	Community owned	1-5	1.2
Deduako	Community owned	Over 45	100
	Community owned	Over 20	75
Boamadumasi	Private	4-10	25

Source: Filed Survey, 2006

Many of the water sources are privately owned because most of those provided by the Municipal Assembly and the community have broken down. Water facilities in Deduako and Boamadumase are owned by community members, with the exception of one well in the latter community which is owned or provided by the Islamic Society in the community.

- Responsibility for sustainability of water facilities

The sustainability of water facilities in Ejisu is mainly the responsibility of service providers. About 72.3 percent of the facilities in Ejisu are privately owned and are sustained by their owners. The remaining 23 percent and 4.8 percent are self and WATSAN committee sustained respectively. As a result, most respondents even though patronised some of these sources were not aware of measures that have been put in place to ensure the sustainability of these facilities.

The situation in the remaining two communities, Deduako and Boamadumase was different. In these communities since the facilities are community owned, it is the responsibility of the care takers, WATSAN Committees, Unit Committees and the whole community at large to ensure the facilities are well handled, maintained and sustained for future use. The figures were inferred from Table 4.

The under listed are some of the measures that have been put in place to ensure sustainability of water facilities.

1. Collection of water rates to undertake both major and minor repairs
2. Employment of care takers to be in charge of repairs

3. Educating people to ensure that facilities are not mishandled, especially by children who often push small objects down the pumps
4. De-silting and regular disinfecting of well and tanks that are used for mechanized boreholes
5. Regular scrubbing, weeding and other maintenances around the environment of the facilities.

➢ Regularity and satisfaction with facilities

The purpose of this issue was to find out how well facilities functioned, how satisfied people were with the services rendered and how important their facilities were to them and hence manage them to ensure their sustainability.

In general, respondents were satisfied with services rendered by these facilities and thus responded positive as to the benefits they received. The following are some of the benefits outlined by them.

- The current sources are better than the river sources, in terms of quality and hygiene.
- Respondents have respectively closer sources, which are considerably cheaper and thus afforded by everyone.
- The problem of acute water shortage has been reduced drastically with the event of more private and self provided sources.
- The problem of long distances and queues has also been reduced, as there are alternate sources of water.
- Some people have also have been provided with a source of income and livelihood.

Concerning regularity of sources, the data in Table 5 shows that a large majority (77%) of respondents responded in the affirmative that water flows regularly while the remaining 23 percent responded in the negative. Those answered in the negative gave the following reasons:

- Lack of water supply, whenever, there is no electricity supply.

This is due to the fact that many of the boreholes in the community are mechanized and therefore run on electricity, thus, whenever, there is a power cut, and people who are dependent on these sources do not get water.

- Frequent breakdowns

This problem is associated with the manual boreholes. Those who get their major sources of water from these facilities sometimes suffer this problem. When this happens, pressure is put on the few remaining ones.

- Regularity for some source like wells is dependent on seasons. Flow of water reduces during the dry season and increases in the wet or rainy seasons.

Table 5: Regularity of the flow of water

Response	Frequency	Percentage
Yes	77	77.00
No	23	23.00
Total	100	100.0

Source: Field Survey, 2006

Other problems associated with water facilities apart from the above mentioned irregularities include:

- The problem of long queuing at some point in time. Though they are not a daily occurrence. This problem arises especially during the dry season, when water is scarce.
- The inadequacy of facilities to serve the total number of people. For instance, Boamadumase with a population of 1261 deserving a total number of four boreholes has only two of them. This is the same for Ejisu which as an urban town should have been given a small water system, now depends on inadequate boreholes and wells.

As a result of these irregularities, 68 percent of households turn to hand-dug wells and rivers while 32 percent turn to other boreholes. However, as some of these facilities, mostly privately owned and thus recorded minimal or no break downs, coupled with the fact that some people alternate the use of sources using well water for household chores and boreholes for drinking, the impact of acute water shortage is minimized.

Sanitation facilities and waste management

Sanitation captures solid waste collection and disposal, liquid waste disposal.

- Solid waste management

Solid waste management in the urban communities of the Ejisu-Juabeng Municipality including Ejisu, Akyaakrom, Besease, Kwaso, and Bonwire is done by the Zoomlion Company limited. This used to be the sole responsibility of the

Municipal Assembly. The current situation is as a result of contracts that the Company signed with the Municipality to manage its waste. The above communities serve as Transfer Stations, where refuse skips have been provided to collect refuse after which they are transported to the Final Disposal Site in the Municipality, located between Abankoro and Ejisu, a site which was once used for sand winning.

- Types of refuse facilities

As provided in the Sanitation Bye Laws of the Municipality on the disposal of refuse, 'where the Assembly has provided at any town or village a refuse skip, no person shall place or cause or permit to be placed any carrion, filth, dirt, refuse or rubbish or any offensive or unwholesome matter on any street, lane, yard, enclosure or open space at such town or village except at the refuse skip so provided'. As such, where there are no skips, the community or village shall allocate a place where refuse shall be dumped to avoid indiscriminate dumping which causes the spread of diseases. Table 6 shows the type of dumping system in the various communities.

Table 6: Types of refuse disposal facilities

Community	Type	Number Available
Ejisu	Refuse Skips	15
Deduako	Refuse Dump	1
Boamadumase	Refuse Dump	1

Source: Field Survey, 2006

Despite the presence of these facilities and laws backing them, the problem of indiscriminate dumping is seen in all communities, especially in the market places, backyards, drains etc.

- Facilities for Liquid Waste (Water) Disposal

The facilities used for waste water disposal in all three communities are mainly drains, earth gutters, catch pits, and open space disposal. This is shown on the Table 7.

Table 7: Facilities for liquid waste disposal

Community	Type of Facility	Number of people	Percentage
	Drains	8	9.8
Ejisu	Earth gutters	17	20.5
	Catch pits	11	13.3
	Open space	47	56.6
Deduako	Drains	1	14.3
	Earth gutters	2	28.5
	Catch pits	1	14.3
	Open space	3	42.5
Boamadumase	Drains	0	0
	Earth gutters	1	10
	Catch pits	3	30
	Open space	6	60

Source: Field Survey, 2006.

The drainage systems in the communities are not very well organised and as much pools of stagnant water and spills from some of these facilities are seen in certain parts of the communities. People patronised these systems because they are their only options and were maintain through daily and regular sweeping and scrubbing and sometimes through communal labour to ensure that they are not choked.

- Types of toilet facilities and ownership

  The main types of toilet facilities in the Municipality include

  - Traditional Pit Latrine (TPL)
  - Ventilated Pit Latrine (VIP)
  - Septic Tank Latrine (STP)
  - Water Closets (WC)
  - Aqua Privies

Table 8 shows the major types of toilet facilities available, the number of people that patronise them in the selected communities.

Some of these facilities especially with the STLs and VIPs in Deduako are government provision while the remaining is individual provision, with that of Boamadumase being community provision.

Table 8: Types of toilet facilities

Community	Type of Toilet Facility	Number	Percentage
Ejisu	STLs	58	69.9
	VIP	11	13.3
	TPL	6	7.2
	WC	8	9.6
Deduako	VIP/TPL	6	85.7
	WC	1	14.3
Boamadumase	TPL	10	100

Source: Field Survey, 2006.

Though these places of convenience are available for people, some people resort to free ranging due to the inadequacy and conditions of these facilities. Most of these public facilities are therefore abused in addition to the pressure that is existed upon them.

This often times leads to the spread of diseases like diarrhoea or dysentery, malaria, typhoid fever and so on. For instance according to the Huttel Health and Development centre in Boamadumase, the four top most cases reported at the centre include; Malaria, Diarrhoea or Dysentery, Typhoid Fever and few cases of Buruli Ulcer and last but not least Anaemia or PCM.

In Ejisu, people pay an amount of five pesewas before accessing the STLs. This money is used to maintain the facilities as well as to pay care takers who have been employed. In the remaining two communities, the facilities are in the

hands of the community members and as such no money is charged. On the other hand, some Unit Committee Members have been appointed to take charge of organising the youth especially school children and apprentices and other people who are exempted from communal labour to clean the toilet facilities every Sunday.

- Problems of toilet facilities

The problems encountered with the toilet facilities are under listed below. The purpose of this is to find out the kind of management system in place to ensure that these facilities are sustained.

- Inadequate toilet facilities

Due to the fact that most of the available facilities are inadequate to serve people, there are often long queues at the few ones, especially in the early mornings. This leads to pressure on the facilities as well as indiscriminate disposal of human excreta and free ranging which does not augur for good sanitation.

- Lack and inadequate maintenance on public toilet facilities

Of all the facilities visited, there were a few or no maintenances on them which lead to their breakdown. An example of such a situation was the breakdown of one STL in Serwaa Akura, a suburb in Ejisu.

- Poor material used in the construction of facilities

Poor building materials used in the construction of some toilet facilities leads to their early break down. One of such facilities as was constructed in Boamadumase collapsed in two years because of the poor materials used by the constructor. Moreover, the existing pit latrine in use has some of the roofing sheets body ripping off.

- Emission of bad odour

This was an issue of major concern. Due to the fact that, chemicals were not frequently put in to them to treat the waste matter and thus polluted the air around such facilities.

- Irregular emptying of toilet

Due to the fact that there is no Cesspool Emptier in the Municipality, it is difficult to empty the toilet facilities, particularly the STLs. Sometimes, it takes as long as six months to empty the excreta and therefore leads to the creation of disease causing environment with the breeding of houseflies, maggots and mosquitoes on them.

- Unkempt facilities

Most of the toilet facilities, though they are cleaned daily by cleaners, they are not done well and to the satisfaction of the customers.

In addition to the above mentioned problems which basically concern public facilities; people who use WCs, due to the fact that some are not connected to water face difficulty in using them.

Measures to ensure sustainability

- The role of maintenances

On the issue of repairs, Table 9 shows that 56 percent out of the total respondents who recorded of breakdowns said that the facilities were immediately repaired when they broke down, whiles 44 percent complained that the facilities were not immediately repaired with the following reason.

  - The delay in repairs was often associated with the fact that it was difficult to mobilize funds, especially with self owned and government owned facilities.
  - Difficulty in finding well artisans to de-silt hand-dug wells
  - Difficulty in finding area mechanics and the right parts for borehole when they break down. This is due to the fact that, there are only four area mechanics for the whole Municipality.

Table 9: Breakdowns and repairs of maintenance

Responds	Time of repairs	Percentage
Yes	Immediately	56
No	Not immediately	44

Source: Field Survey, 2006

- Role of payment of water rates

Questions pertaining to the payment for water or usage of facilities were also inquired. This was to find out their contribution in terms of finances to the sustenance of the facilities. The survey showed that all communities visited paid for the services they received, with the exception of a few situations where people did not pay. Those who did not pay either owned the facilities themselves or for some special reason was not sold to the public as in Ejisu where one of such facilities was provided by the chief of the community. The funds realized from these payments were used to uptake repairs.

- Mode of Payment

The mode of payment in place in each community determines how effective operations and maintenances would be. Table 10 shows the system of payment and the amount charged in the communities visited.

Table 10: Mode of payment for water

Community	Mode of Payment	Amount Charged (per bucket)
Ejisu	Pay as you fetch	5 pesewas
Deduako	Pay as you fetch	1 pesewa
Boamadumase	Pay as you fetch	1 pesewa

Source: Field Survey, 2006.

From Table 10, the payment as you fetch mode prevailed in all three communities, it was more effective and not difficult to collect the rates as other

systems like the monthly and quarterly collections were. Moreover, some of these facilities were privately operated and thus people paid as they fetched.

Role of technical assistance

The planning and provision of facilities and infrastructure to say cannot be done without the right and identified institutions to take charge of every stage of the process. Some of the institutions associated with the provision and management of water and sanitation facilities are as follows.

A. The Municipal Assembly

The Ejisu-Juabeng Municipal Assembly is one of the highest decision making and control body in the Municipality. It has sub-units like the Water and Sanitation Agency and the Environmental Health Department who are in charge of Water and Sanitation in the Municipality. Its major contribution is the provision of funds to fund projects and purchase the necessary logistics as well as employing the requisite and competent personnel to take charge of the functions as determined by the Municipal Assembly.

The major types of water and sanitation facilities the Municipal Assembly provides include:

- Boreholes (300 people per facility)
- Small Town Water projects (population of 2000 and above)
- Household, Institutional and Public Toilets

These facilities are demand driven and are therefore provided based on the

population of a particular town or community. The population of a town determines the type and number of facilities to be provided.

Another reason for the provision of these is the objective of the Municipal Assembly to promote good hygiene and access to potable water in the Municipality. This is because a survey undertaken by the Municipal Water and Sanitation Team, revealed the water and sanitation status in terms of the availability of facilities is below 40 percent for water and 20 percent for sanitation and therefore the need to provide communities who lack facilities.

In view of this, people and communities are encouraged under the Hygiene Programme of the Institution to put up household toilets, which are safer than the use of public facilities. The programmes include a package where fixed amount of subsidies are given to households, who express interest in the programme. Where a household cannot afford to pay the rest of the cost, they can contribute in terms of materials which will be used in constructing the facility, or start with the digging of the manhole for the programme to lay the blocks.

For institutions and communities, a commitment fee of five percent is required. The Municipal Assembly also pays five percent whiles the remaining 90 percent is catered for by the programme. In providing these facilities, the type of facility provided, for instance, boreholes depends on the depth of the water table as shown in Table 11.

Table 11: Types of borehole pumps

Type of Pump	Depth
Nira	50 meters
Afridev	Above 50 Meters
Indian Mark II	Above 50 Meters

Source: MWSA, Ejisu.

These facilities can last for a very long time depending on how they are used and managed. As such the beneficiaries are involved in the process to ensure that they take control of operation and maintenance.

B. Municipal water and sanitation agency

This is made up of Municipal water and sanitation Team (MWST) whose functions include the following

- Sensitization
- Site Selection
- Monitoring and Supervision

The MWST link the Municipal Assembly and stakeholders. They do this by coordinating and organising Fora/Meetings and workshops with the stakeholder and then reporting back to the Municipal Assembly. These meetings are held once a year and as when the need arises.

To ensure the sustainability of the facilities, the Team provides management committees (WATSAN) are inaugurated in beneficiary communities. However, in accounting for the conditions of some of the facilities,

the Tame has provided some of them like boreholes; hand-dug wells are broken down, whereas some Small Town Water Projects are not yielding the required results to meet the demand of communities even though WATSAN Committees are in place.

The DACF, user fees and funds from Development Partners are the major sources of funds that the MWST rely on for the implementation of new projects and the rehabilitation of broken down facilities. These funds are not reliable due to its lateness in arrival.

C. Municipal environmental health department

This is the unit in charge of environmental cleanliness and sanitation in the municipality. It is therefore their duty to ensure that people abide and by the Sanitation Bye-laws by ensuring that their surroundings are kept clean and tidy to prevent the spread of diseases. They do through Sanitary Inspectors who go round to ensure that people keep a clean environment. Formerly it was this department that was in charge of solid waste management until they signed a contract with the Zoomlion Company Limited to take over.

In spite of this handing over the company, the Municipal assembly through the unit has provided facilities like refuse skips, tractors, skip holders and other equipment to help with the management of waste in the Municipality. In addition to this, it has employed labourers to take care of the refuse skips it has provided.

Liquid waste management (night soil) is controlled by the department through the unit committees, especially in the Ejisu and other urban communities in the municipality. They employ care takers who take of the toilet facilities.

D. Zoomlion Company Limited

It is the company who is in charge of solid waste management in the urban communities like Ejisu, Onwi, Bonwire, Akyaakrom, Kwaso and Besease in the Ejisu-Juabeng municipality.

The equipment used in the collection and disposal of the solid waste include skips, tricycles, skip holders and trucks. Even though these equipments have ling lifespan, some of them like the tricycles are broken down due to the fact that the load weights they are used to carry are too much. Moreover, there is lack of available spare parts to repair them.

In maintaining or ensuring that refuse skips are sustained, they are designed with a perforated base to allow water to drain out.

E. WATASN committees

The WATASN Committees are the committees that are commissioned to take charge and manage facilities after they have been provided. The committee is made up of a Chairman, a Secretary, a Treasurer, a Pump care taker and someone in charge of hygiene and sanitation. The committees are formed in the process of project implementation. Members are nominated by community members through community meetings. Their functions include:

- Taking charge of the water and sanitation facilities
- Ensuring that funds mobilized from the sale of water and the use of toilet facilities are used for operations and maintenance
- Keeping safe of funds generated, part of which is used to pay care takers and also for community development needs as the replacement of streetlights bulbs etc.
- Organizing community members to undertake self-help projects.

F. Care takers

Care takers are the people who have been employed to take collect money for the use of the facilities and ensure the proper management of the facilities. As observed from the study, most of the care takers are women. Some of their functions include:

- Ensuring that the facilities and its surroundings are kept clean and hygienic
- Reporting any problems identified with the facilities to the authorities.
- Making sure the daily expected sales are met and given to the right people for safe keeping.

Potentials, Opportunities, Constraints and Challenges (POCC) of institutions in sustainable community water and sanitation development

Potentials are internal enabling factors which these institutions to work. Opportunities on the other hand are external factors which promote effective

work, whereas constraints are internal factors that inhibit effective work, with challenges being external factors which do not augur well for smooth operations. Table 12 considers the POCC of the institutions already discussed.

Table 12: POCC Analysis of some Institutions in charge of Water and Sanitation

Institution	Potential	Opportunities	Constraints	Challenges
The Municipal Assembly	1. The presence MWSA. 2. The availability of DACF	1. The presence of development partners. 2. The participation of beneficiaries in projects	1.Inadequate funds 2. Poor management on the part of some communities 3. Inadequate NGOs and Development partners.	1. Delay of the DACF
MWSA	1. Availability of wetlands which enhances easy drilling 2. Availability of trained mechanics	1. The presence of development partners	1. Inadequate funds 2. Poor access roads to some communities	1. Prolonged drought in some areas. 2. Urbanization 3. Encroachment on water resources
Municipal Environment Health Department	1.Availability of sanitation bye-laws 2. Availability	1. The presence of development partners (Zoomlion)	1. Insufficient and lack of equipment 2. Delay of	1. Non-compliance with some people 2. Apathy

	of sanitation facilities		funds	3. High level of illiteracy of people
Zoomlion Company Limited	1. Availability of equipment. 2. Availability of labour	1. Availability of foreign equipment. 2. the presence of development partners (Municipal Assembly	1. Lack of sheds to keep some equipment. 2. Non-availability of spare parts	1. lack of final disposal site 2. difficulty in operating with 'pay as you dump' for effective management
WATSAN Committees	The spirit of Volunteerism	1.The presence of MWSA 2. The Availability of training programmes	1. lack of commitment of some members 2. bad behaviour of some members	1. Inadequate Training 2. Interference of Unit Committees

Source: Field Survey, 2006

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter presents a summary of findings, the conclusion and recommendations made by the researcher.

Summary

The purpose of this study was to assess community water and sanitation systems and its effects on sustainable water and sanitation delivery in Ejisu-Juabeng Municipality. Both quantitative and qualitative research methods were used. Data was gathered through household surveys using interview schedules and unstructured interviews. The main findings of the study are as follows:

- Provision of water and sanitation facilities was basically done by the Municipal Assembly, Private Operators and Individuals. The facilities provided included boreholes, hand-dug wells, and household toilets, institutional and public toilets. It was observed that the responsibility for sustainability of these facilities rests on the owners of these facilities.
- Water and sanitation facilities are inadequate. This leads to people to resort to unhygienic and unsafe resources.
- Measures to ensure sustainability of water and sanitation facilities included collection of water rates to undertake both major and minor repairs, employment of care takers to be in charge of repairs, educating

people to ensure that facilities are not mishandled, de-silting and regular disinfecting of well and tanks and regular scrubbing, weeding around the environment of the facilities. In general, respondents were satisfied with services rendered by these facilities.

- It was observed that beneficiary communities were involved in the provision or implementation of projects. This was done through initial awareness creation before the project began, paying five percent of the total cost of the project to serve as commitment fee and through public meetings and WATSAN committees who then take charge of the facilities.
- It was realised that good or poor participation affects the sustainability of the facilities either positively or negatively. While good participation promoted community ownership and management, thus ensuring sustainability of these facilities, poor participation did the opposite. For instance, in communities like Akyaakrom, Odoyefe and Achiase, good participation has promoted effective management of the facilities available. On the other hand, in communities like Ejisu, AdakoJachie and New Bomfa, management is not effective due to inadequate participation.
- The WATASN Committees takes charge of the water and sanitation facilities by keeping safe of funds mobilised and managing caretakers. It was observed that operations and maintenances were done by WATSAN Committees, Area Mechanics and Private Individuals.
- Major organisations facilitating technical assistance were the Ejisu-Juabeng Municipal Assembly, Zoomlion Company Limited, WATASN

Committees and Care Takers. The Ejisu-Juabeng Municipal Assembly purchase the necessary logistics and employ the requisite and competent personnel to take charge of the functions as determined.

- It was found that funds for the provision of facilities were mainly from the Municipal Assembly, Donor/development partners and beneficiaries. Funds for operations and maintenance usually were from the sales of water and usage of sanitation facilities. Where beneficiaries are unable to mobilize funds for operations and maintenances, facilities were left unrepaired for a long time until funds were mobilized or the Municipal Assembly or a Donor Agency comes in or the communities themselves mobilize funds.
- It was also found the area mechanics lacked formal training and so their works were usually unscientific. Members of the WATSAN committees also lacked adequate training required to give off their best. Therefore, they did not comprehend and adopt new trends in technology accompanying water and sanitation projects.

Conclusions

It is clear from the analysis that the sustainability of water and sanitation facilities depends on the management system in place, the persons in charge of the management, availability of funds to sustain them and many other factors as have been discussed already.

It was the objective of this study to access measures that have been put in

place to ensure sustainability, the providers of facilities, examine the level of beneficiary participation, investigate the competences of the various institutions to ensure the sustainability of water and sanitation facilities as well as investigate whether funds are available for the substance of these facilities and finally make constructive recommendation to help improve sustainability.

This has been realised as all or almost all of these objectives have been achieved. It is believed that if the above mentioned recommendations are put to use or implemented, it would go a long way to improve the sustainability of water and sanitation programmes in Ghana in the Ejisu–Juabeng Municipality.

Recommendations

Based on the findings, the following measures are recommended:

1. Additional provision of facilities

It is imperative to provide additional facilities to serve the growing population. This can be done by encouraging households, institutions, more NGOs and private firms to enter the water and sanitation sectors. It will improve the water and sanitation status of the municipality.

2. Improving beneficiaries participation

As the findings show, good participation can go a long way to ensure the sustainability of facilities. When beneficiaries are involved, they see the projects as their own and thus manage them well. Beneficiaries should also be educated on the needs to participate in the project implantation.

3. Operation and maintenance

It is recommended that regular training be organised for the Area Mechanics and WATSAN Committees to improve their knowledge on operations and maintenances. The number of the Area Mechanics should also be increased to ensure that the whole municipality is fairly covered. Users, especially children should be educated on the need to handle the pumps to increase their elasticity.

4. Improving the role and capacity of WATSAN Committees

WATSAN Committees play a very important role of ensuring the sustainability of water and sanitation facilities. It is therefore important that their membership and roles they play be taken seriously by the MWSA and other authorities in charge of them. Members should be motivated to help boost their moral to work and give out their best.

5. Improving funds mobilization

Beneficiaries should be made aware on the need to mobilize funds. This will help improve financial sustainability of facilities. Special accounts should be opened where money mobilized can be saved for future use. People in charge of the money collection and keeping should be made accountable to the community members to ensure that funds mobilized are not misappropriated by unscrupulous persons.

6. Technical sustainability

On the issue of technical sustainability, it is recommended that, spare parts shop be established in the municipality to make it easier for parts to be gotten easily. Moreover, the right parts should be used to avoid frequent break downs.

7. Increasing hygiene education

People should be educated on the need to practice good hygiene practices to promote clean and healthy environments devoid of diseases. This would decrease the indiscriminate disposal of refuse and human excreta which are common in almost all communities.

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APPENDICES

APPENDIX A

INTERVIEW SCHEDULE FOR HOUSEHOLD MEMBERS

1. Sex
    a) Male [ ]
    b) Female [ ]
2. Age:
    a) 21-25 [ ]
    b) 26-30 [ ]
    c) 31-40 [ ]
    d) 41+ [ ]
3. Level of Education:
    a) No Education
    b) Primary Education
    c) Basic Education
    d) Secondary
    e) Tertiary
    f) Other

WATER

4. What are the major sources of water supply to you?

    _____

    _____

5. Why do you patronize these sources of water?

_____

_____

6. For how long have you been patronizing the above water sources?

_____

_____

7. Who do you think are responsible for maintaining these water sources?

   Municipal Assembly ( )

   WATSAN Communities ( )

   Caretakers ( )

   Other ( )

8. Are you satisfied with the sources of water available for you?

_____

_____

9. If no, please explain why?

_____

_____

_____

10. How much do you pay as water rates?

_____

_____

_____

SANITATION

11. Who is majorly responsible for managing solid waste in your Municipality?

_____

_____

_____

12. How effective is/are their work?

_____

_____

13. What are the types of refuse disposal facilities available to people in the Municipality?

_____

_____

14. What facilities for liquid waste disposal are available to you?

_____

_____

15. Do you a toilet facility in your home? Yes ( ) No ( )

16. If Yes, what is the type of facility?

Traditional Pit Latrine (TPL) ( )

Ventilated Pit Latrine (VIP) ( )

Septic Tank Latrine (STP) ( )

Water Closets (WC) ( )

Aqua Privies ( )

Other _____

17. If No in 15, which facility outside do you patronize?

_____

_____

18. How much do you pay as rate?

_____

_____

19. What are the major water and sanitation issues in the Municipality?

_____

_____

_____

_____

20. What solutions do you offer?

_____

_____

_____

APPENDIX B

INTERVIEW SCHEDULE FOR WATSAN COMMITTEES

1. When was the committee formed?

   (a) Before project [ ]

   (b) After project [ ]

2. How was it formed?

   (a) Appointment of members [ ]

   (b) Nominations [ ]

   (c) Elections [ ]

3. How many men and women are on the committee? (State number)……

   ……..

4. How do you participate in project implementation?

   ……

   ……

5. Have you received/do you receive training?

   …….

   ……..

6. When/how often are you trained?

   ……

   …….

7. What roles do you play? ……

   …….

8. Are you constrained or challenged in any way in performing your roles?

   ……

   ……..

9. How do you think these problems above can be resolved?

   ……

   ……

10. Are care takers of the facilities part of the committee? (Probe about caretaker)
11. How do you ensure the sustainability of the facilities that are entrusted in your care?

APPENDIX C

INTERVIEW SCHEDULE FOR DEPARTMENT OF WASTE MANAGEMENT

1. What kind of waste do you manage? ……....

   ……

2. How do you collect and dispose of the waste? …….....

   ……

3. What types of facilities do you employ in waste collection and management? ……

   ……

4. What is the average lifespan of these facilities? ……...

   ……

5. Have the available facilities served their lifespan? (a) Yes (b) No

   i. If No, why? ……..

   ii. If Yes, why? ……....

6. How are they acquired?

   (a) Government provision [ ]

   (b) Development Partners [ ]

   (c) District Assembly [ ]

   (d) NGOs [ ]

   (e) Others (specify)……

7. Are the facilities adequate?

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

8. If No, why? .....

   ……

9. How are the facilities sustained? ……...

   ……

10. What problems do you encountered concerning the sustainability of these facilities?.....

    .....

11. How do you think these problems can be solved? ……

    ……

12. Do you have any partners in managing the waste? (List them)

13. In what ways do they contribute? .....

    ……