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WATER RESOURCE MANAGEMENT IN GHANA-THE CASE OF THE EKUMFI DISTRICT

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DECLARATION

I, Amoah, Adwoa Amowa declare that this thesis is my own work. Apart from the relevant secondary data employed for this study which have been duly acknowledged, no part of this thesis has been presented by me or any other person to any university for the award of any degree.

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DEDICATION

This thesis is dedicated to my dad, Mr. Justice Amoah; my mom, Madam Faustina Quansah (AKA Nana Nkumah 1) and my siblings, Kojo Amoah, Jennifer Abena Amoah and Kow Odaba Amoah

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ABSTRACT

Worldwide, safe and reliable water supply has become an increasingly essential element of development programmes designed to sustain human life. The Ekumfi district like many parts of Ghana faces water related stresses such as pollution, deforestation especially around water bodies, and low quantity of pipe-borne water supply among other issues. Problems of this nature have often been attributed to weak institutional roles of institutions in charge of water resource management. This study therefore sought to analyse the role of stake-holders especially the CWSA. In light of this, the study adopted the case study design and mixed method strategy to collect data. From the findings, it was revealed that the general capacity level of the CWSA as an institution was low which hampered the smooth operation of its responsibilities. It was also revealed that although there was a strong coordination between the district assembly and the CWSA (DWST), the involvement of other related water agencies in water resource management in the district was very limited. The study also identified that to some level, community members were involved in water resources management although, participation at the district level was not very much encouraged. Lastly, it was highlighted that rules and regulations on water in the district were not being adequately enforced by authorities and hence communities were not sufficiently adhering to these rules and regulations. As a result, it has been suggested that, institutions in charge of water resource management should be well capacitated to ensure safe supply of water. Strong inter-institutional coordination and collaborations as well as effective community participation in planning and implementation of water projects should be encouraged, to help eliminate water related stress in the district.

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LIST OF ACRONYMS AND ABBREVIATIONS:

AMCOW	African Ministers' Council on Water
DESSAP	District Environmental Sanitation Strategy and Action Plan
DWST	District Water and Sanitation Team
FAO	Food and Agriculture Organisation
CONIWAS	Coalition of NGOs in Water and Sanitation
CSIR	Centre for Scientific and Industrial Research
CWSA	Community Water and Sanitation Agency
EHSD	Environmental Health and Sanitation Directorate
EPA	Environmental Protection Agency
GIDA	Ghana Irrigation Authority
GMet	Ghana Meteorological Agency
GWCL	Ghana Water Company Limited
GWP	Global Water Partners
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IWRM	Integrated Water Resources Management
LGSC	Local Government Service Commission
MDG	Millennium Development Goals
MMDAs	Metropolitan, Municipal and District Assemblies
MLGRD	Ministry of Local Government and Rural Development
MoFEP	Ministry of Finance and Economic Planning
MWRWH	Ministry of Water Resources Works and Housing

NCWP	National Community Water and Sanitation Commission
NWP	National Water Policy
NDPC	National Development Planning Commission
NGO	Non-Governmental Organisations
SWAp	Sector Wide Approach
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNW-DPC	United Nations Water Decade Programme on Capacity Development
UNW	United Nations Water
WATSAN	Water Supply and Sanitation Committee
WRC	Water Resources Commission
WRI	Water Research Institute
WSSDP	Water Sector Strategic Development Plan

CHAPTER ONE

GENERAL INTRODUCTION

1.0 Introduction to the study:

Globally, provision of safe and dependable water supply has become an increasingly essential component of any development programme designed to sustain human life. Example, Millennium Development Goal (MDG) 7, target C is aimed at reducing by half, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation. Water is about sufficiency, quality, availability (space) and time and its management is crucial to ecological and social welfare. Although the twentieth and the twenty first centuries have witnessed the emergence of many approaches to water resources management, management of water resources has a long history. Water resources management goes back to prehistoric times as attempts in respond to seasonal changes in water availability and continued to be even more crucial as societies evolved from small farming communities to industrial towns, cities and administrative centres (Chene, 2009).

However, the need for proper management of water resources has been heightened especially recently by several factors, one of which is severe droughts and floods which contributed to food crisis leading to starvation and deaths in some parts of the world in the early 1970s (Biswas, 1983). Management of water was therefore recognised as absolutely essential for expansion of agriculture and also for the overall increase in crop yield to feed the ever increasing world population. Feeding this ever increasing

population of mankind will require producing more food with water through efficient use of water in agriculture (UN Water, 2011).

Secondly, as more countries raced towards development and poverty reduction in general, better managed water resources was recognised as a critical element for socio-economic development and for maintaining healthy ecosystems functions (Wallace et al, 2003). Proper management of water resources are undoubtedly critical in ensuring economic growth, and the reduction in poverty as well as ensuring equity (Hassing et al, 2009). Also in most parts of the world the poorest (who are mostly farmers) largely depend on access to water for their livelihoods (El-Gohary, 2010). Inadequate access to water therefore forms a central part of poverty, in that it directly affects basic needs, health, food security and basic livelihoods (Essaw, 2007). Water supply is therefore a key factor in ensuring human well-being. Currently, the Millennium Development Goals report indicates that 1.1 billion people lack access to safe drinking water.

Higher rates of urbanisation and growing population associated with increasing demand for drinking (portable) water add to the pressures on existing water sources. 'Potable water or drinking water is water of sufficiently high quality that can be consumed or used with low risk of immediate or long term harm' (Dei, 2011). Contaminated water exposes people to water borne diseases such as cholera, guinea worm, etc. Although these diseases are curable, they do not only spread easily but are potentially deadly and can eventually affect productivity of labour and stifle progress (Dei, 2011; Essaw, 2007).

In addition, pollution of water bodies (both inland and coastal) from fertilizers, pesticides, and industrial effluents especially in developing counties continue to affect water resources (Chene, 2009; Essaw, 2007). Forests reserves which naturally serve as

water catchments are increasingly being exploited for fuel, lumber and mining. These challenges have evolved from the tradition of indiscriminate water use that had little or no respect for the finite nature of water resources (UN-Water, 2011).

Current surge in technological advancement has catapulted energy demand, and it is estimated that this energy demand will more than double in poor and emerging economies in the next 25 years. Hydropower will therefore be a key factor in ensuring clean energy production. This can only be achieved if more water is made available. Adding to this uncertainty, global climate change will increase the complexity of managing water resources (Hassing et al, 2009). In some parts of the world, there will be more water but in other parts like Africa, there will be less. Given the current trend of population growth and increasing demands of water both in quantity and quality, coupled with an alarming growth rate of pollution and destruction of water catchment basins, the issue of water resource management is becoming more important than any time previously in the history of Ghana (Dei, 2011).

Though Ghana is much endowed with a tremendous amount of fresh water, water resources in the nation are in danger of massive degradation and depletion. Water resources challenges include, uncontrolled catchment degradation caused by poor agricultural practices especially, farming along riverbanks (Water Resource Commission (WRC), 2012). Population pressure has resulted in the clearing of forest for resettlement and industrialization, as well as deforestation (for agricultural land and fuel wood) and surface mining have all contributed to water stress in the country. Pressures due to climate change and climate variability have contributed to high variability of water in river channels affecting water supply and river transport (WRC, 2012). The challenge

therefore has been to deal with the variability of water in space and in time to enable mankind to have access to water for various uses and also for the protection of vital ecosystems (Essaw, 2007). The situation thus calls for the efficient and effective management of available water resources (Ministry of Water Resources, Works and Housing (MWRWH), 2007, 2011).

Water reforms since the 1990's have been implemented in Ghana's water sector aimed at enhancing the efficiency in the production and utilization of water (MWRWH, 2007). In recent years, reforms such as the 2007 Ghana Water Policy have aimed at water resources management that encourages multi stakeholder coordination with the view of integrating and harmonizing their various activities. This National Water Policy is made up of basic strategic planning components which consist of the national Integrated Water Resources Management (IWRM) plan, the Urban Water Strategy and the Rural Water Supply and Sanitation Strategy.

Most institutions and researchers (see for instance, Saravanan et al, 2009; Hassing et al, 2009; MWRWH, 2007; Essaw, 2007; Jonch-Clausen, 2004) have argued that successful implementations of these strategies and plans depend on a variety of factors which include, putting in place identifiable institutional frameworks to avoid conflicts of interests among water sectors and especially for the participation of local communities. Institutional capacity building is very essential in establishing institutional frameworks for water resources management. These include training and awareness programmes as well as effective funding (MWRWH, 2007). The government or statutory body in charge of water resources either at the national or local level plays an integral role in directing

the process of stakeholder coordination in ensuring the supply of safe and reliable water as well as the sustainability of ecosystems (Saravanan et al, 2009).

As part of institutional framework is community participation. Participation or involvement of community members in the implementation and management of water resources and project is an essential part of water resources management (Poolman, 2005). Community participation in this regard refers to the involvement of community members (people in a geographical setting with a common boundary) in projects that are meant for them, in others words, projects that affect them. Participation of community members in water resources management has been related to equity in Ghana in that programmes and projects focus on the weaker sections of the society- the poor, the landless and most importantly, women, who play central role in the provision, management and safeguarding of water (Essaw, 2007; United Nations Water-Decade Programme Capacity (UNW-DPC), 2011; European Report on Development, 2012).

The second important ingredient is, by establishing an enabling environment to facilitate appropriate policies, strategies and legislations for sustainable water resources development and sectoral linkages for effective management and lastly, by setting up the management instrument required by all stakeholders to work effectively (Saravanan et al, 2009; Hassing et al, 2009; MWRWH, 2007; Essaw, 2007; Jonch-Clausen, 2004). They have argued there is the need for coordination between public statutory actors and other water related agencies in the planning and execution of water resources management and processes. Coordination in this sense is "*a process that involves mobilising a sufficient number of people for enterprising activities*" (Saravanan et al, 2009; 80). This is when

different actors supply knowledge in the designing and implementations of policies and strategies in a consensus manner.

Water resources management in the Ekumfi District which is mostly rural is under the jurisdiction of the Community Water and Sanitation Agency. The CWSA is a governmental institution responsible for planning, coordination, regulation, supervision, quality control, training and capacity-building for rural water and sanitation delivery through the implementation of the National Community Water and Sanitation Programme (NCWSP) (WRC, 2012). The Ekumfi district faces a myriad of water problems ranging from low quality of pipe-borne water, drying up water bodies to pollution and deforestation etc. (Roncha, 2012). This has therefore called for an assessment of the CWSA's role in water resources management in the district by looking into what the institution is doing, supposed to and what it is not doing.

This study thus seeks to investigate the role of the CWSA as the statutory public agency in charge of water resources management in rural and small towns by assessing their strategies to boost community participation in decision making, the capacity to facilitate sustainable and safe water delivery, as well as the ability to enable coordination among actors as part of their mandate.

1.1 Research Problem:

Currently, water supply to most areas that are mostly rural areas is catered for by the Community Water and Sanitation Agency (CWSA), and coverage to rural and small towns is only about 54% (United Nations Educational Scientific and Cultural Organisation (UNESCO), 2009).

CWSA is to facilitate the provision of safe water and sanitation services to rural communities and small towns in an integrated manner (ideas from IWRM), (Section 2 of Community Water and Sanitation Agency Act, 1998, Act 564) (Odame-Ababio, 2005, Essaw, 2007). It must support district assemblies in promoting sustainable safe water and sanitation services in rural areas; support district assemblies to encourage the participation of communities, especially women, in the management and the construction of water and sanitation facilities (MWRWH, 2007).

Among its responsibilities, the CWSA has to design strategies for mobilising resources for the execution of water and sanitation projects. To achieve this objective, "*it must encourage the private sector to participate in the provision of water and sanitation facilities; provide district assemblies with the technical assistance required for executing water and sanitation projects; co-ordinates the activities of NGOs (Non-Governmental Organizations) involved in the provision of rural water, sanitation and hygiene education; collaborate with the Ministries of Local Government, Environment, Health and Education in increasing consciousness about water related health hazards and set standards for the provision of water and sanitation services. It also has to charge fees for the services it provides and it must collaborate with International Agencies it considers necessary for implementing its programmes"* (MWRWH, 2007)

The CWSA should also work in close collaboration with the Water Resources Commission, and also the Environmental Protection Agency, as well as the GWSC and other public and private institutions that are involved in water service delivery and sanitation service provision to rural and small towns in Ghana (Mensah, 1999, MWRWH, 2007).

Water supply in the Ekumfi district comes from Kwanyako. Most of the communities scarcely get water supply (District Environmental Sanitation Strategy and Action Plan (DESSAP), 2009). The communities therefore depend mainly on boreholes, wells, and streams, which dry up in the dry season (DESSAP, 2009). This district which is mainly rural like many districts in the central region and under the Community Water and Sanitation Agency (CWSA), faces water related stresses for most part of the year, due to regular power cuts, minor capacity of water treatment plant, out of date pipelines and equipment; low quantity of pipe borne water, dying water bodies, deforestation and pollution around water bodies especially (DESSAP, 2009; 2013 Composite Budget).

Potable water which is said to be life is not totally accessible to the majority of the people in the district, especially in the eastern part mainly due to high salinity and iron content of the soil. Rampant shortage of water in this area affects their activities in that a lot of time is wasted in searching for water (especially among women and children) from limited alternative sources (DESSAP, 2009).

Children spend most of their time searching for water other than getting formal education which is one of the reasons why basic education enrolment is very low in the district (DESSAP), 2009). Rivers like Ochi, Narkwa as well as lagoons along the coast of the district are polluted mainly from human activities like washing, burning, and farming, bathing and dumping of both solid and liquid waste. Trees around water bodies are increasingly being cleared for farming and housing purposes (Roncha, 2012).

At the same time, as seen in many part of the country, climate change is aggravating risk and unpredictability for farmers in this district, in that there have been prolonged inadequate rainfall. This affect the quality and quantity of water flows in rivers and

streams, drying up of wells during dry seasons because there is not enough reserve, wild fires, extreme heat, water related diseases, general crop failure and therefore financial resources are spent on replanting. Donor support plus budgetary allocations have been dedicated towards water resources management strategy implementation every year (DESSAP, 2009). The Ekumfi district in the year 2013 (according to the 2013 Composite Budget) was allocated GHS. 56,500.00 purposely for the improvement in water and sanitation in the district. Also, to check environmental degradation and to create awareness about climate change adaptation strategies, with the water sector alone being allocated 22,000.00 towards the provision of affordable and safe water (MMDA's composite budget, 2013). However, access to safe water and management of water resources still remains a major challenge in the district (Roncha, 2012).

These problems in the district have been attributed to the ineffectiveness of the CWSA in implementing water policies on the ground. The CWSA has been accused of being centralized in nature with top-down and supply oriented management system as well as poor coordination with other stake-holders in the water resources management sector (Adjomah, 2010). Unless a community is ready to pay its contribution for the water facility and is prepared to maintain it, it does not become part of the programme (Mensah, 1999). Water from the facility is also sold to community members. Presently, there is no mechanism for allowing people who cannot afford to pay for water to get it for free or even at a subsidized fee considering the fact that most of the communities are poor (Mensah,1999).Institutional frameworks developed for coordination are based on top-down, command and control approach. Poor inter-agency coordination between CWSA

and non-governmental organisations had during the past years led to doubling of efforts, contrariety and inconsistency (Essaw, 2007).

According to Essaw (2007) and Bekoe (2005), planning processes of water resources management adopted appear to be contrary to existing policies. As stated earlier, the CWSA must work with district assemblies, coordinate with NGOs, and collaborate with ministries of environment, health, education, water resources commission, environmental protection, GWSC and must ensure the participation of community members, opinion leaders and women especially in the management of water resources in rural areas and small towns. The questions now are to what extent are these policies or principles adopted by CWSA being operationalised on the ground? How do they implement their mandate? What is the capacity of the CWSA as the statutory institution in charge of water resources management and water service delivery to small towns and rural areas? How often do stake-holders coordinate on the execution of a water resource management strategy? Are community members especially women involved in the planning and execution of projects? Community members are seldom involved in decision making and implementation of water resources management projects which affect them directly. In addition, is water resources management in the Ekumfi District the same as in the past as Essaw (2007) and Bekoe (2005) believe, but hiding under the current "*fashionable labels*" of internally accepted water resources management frameworks such as multi-sectoral and community participatory approaches to water resources management in order to attract additional funds or to obtain greater national and international acceptance and visibility? They argued that, water resources management policies in Ghana which are mostly heavily influenced by these internationally accepted management frameworks at

best, remain only on paper. Isang, (2011) asserts that even though Ghana has always participated in every United Nations agenda, in actuality what exist is a ridicle of these sustainable development issues. This research therefore focuses on the role of stake-holders especially the CWSA in the protection, participation and implementation of water projects and management and aims to investigate as to whether policies stated on paper concerning water resources management are being operationalised on the ground or not.

Many researchers have advocated for the type of water resource management that brings about a shift from the usual centralised manner to a decentralised system which involves municipalities, cities, districts and localities (see for example, Chen and Xia, 1999; Adjomah, 2010; and Acheampong, 2011). There are others who have concentrated on the adoption of integrated approaches to water resource management as the best means to water resources management but have however concentrated on the planning processes other than the plan (Odame-Ababio, 2002; Essaw, 2007; Isang, 2011). Other researchers have focused on one aspect of water resources management, concentrating on ecosystem development, specifically river basin management strategies (Korsgaard, 2006; Hagan, 2007).

Despite these many researches, less literature has covered how water resource management policies are implemented on the ground especially by the CWSA. It is against this background that the need for a comprehensive analysis of water resource management in the Ekumfi district has become necessary.

Given that, in the Ekumfi district which is largely rural where majority of the population is largely dependent on agriculture and fishing, access to portable water and management of water resources in general is a challenge, an analysis of Water Resources Management

in this district will provide a better assessment of the current water situation in the district.

1.2 Research Questions:

- What is the capacity level of the CWSA in the provision of water to communities in the study area?
- What is the state of the provision of potable water in the district
- How frequent does the CWSA coordinate with other agencies (public and private) in the execution of water resources management strategies and projects?
- To what extent are community members involved in the planning and implementation of projects and management of water facilities?
- What laws have been set to check environmental practices which affect water resources quality and quantity and their effectiveness?

1.3 Goal and objectives of the study:

The Goal of this study is to analyse water resources management policy and its implementation on the ground by focusing particularly on the role of CWSA. The specific objectives of the study are:

- To assess the institutional capacity of the Community Water and Sanitation Agency in the supply of safe and reliable water and the management of water resources in the study area;

- To examine the nature and extent of coordination between the Community Water and Sanitation Agency and other water related agencies (public and private) in the execution of water resources management strategies and projects;
- To analyse the level of involvement of community members in the planning, implementation and management of water provision projects;
- To examine the existing water laws and regulations, their effectiveness and the adherence level of community members of them; and
- To offer suggestions for improving water resources management in the study area.

1.4 Significance of the Study:

The findings of this study will help to assess water resources development and sustainable ways water resources are utilized. The debate that this research may generate would go a long way to help in finding the effective, efficient and sustainable ways of managing water resources in the country.

1.5 Proposition:

This study proposes that the challenges of access to water and water resources management in the Ekumfi District are as a result of

1. Low capacity of the CWSA
2. Poor inter agency coordination between the CWSA and other related agencies
3. Low community participation in decision making especially at the district level regarding planning and implementation of water projects

4. Weak enforcement of laws on water

1.6 Limitations of the study:

The first major limitation of the study was the low literacy level of the respondents sampled in the sampled communities. As a result, the researcher had to resort to conducting interviewer-administered questionnaire on non-literate respondents with the help of field assistants. Although this process enabled the researcher to interact more with respondents and also enabled the observation of non-verbal communications, it was very tedious and time consuming.

The second limitation was the large sample size for the study due to the population of the communities sampled for the study. Due to time and financial constraints as well as other factors beyond the researcher's control, only 200 questionnaires were retrieved out of 376.

1.7 Organisation of the thesis:

This thesis is divided into six chapters. Chapter one sets the scene for further investigation of issues in the subsequent chapters by looking into water resources management issues both at the world and local level, the research problem, the questions driving the study, the objectives as well as the significance and propositions of the study.

In chapter two the link between past and current water resources management practices especially in Ghana is established by delving into implementation of policies, challenges as well as the opportunities of such management practices. Chapter three presents the theoretical and conceptual background of the study. This chapter also presents a detailed

description of research strategy and design as well as various sampling techniques and analytical procedures adopted for the study.

Chapters four and five discuss the results of data collection and analysis of the objectives of the study. The institutional capacity of the CWSA and its ability to coordinate the activities of all water related sectors are described in chapter four. Chapter five offers a critical analysis of the level of community participation in water resources issues in the district as well as the compliance to the laws and regulations established in the district to protect and conserve water resources in the Ekumfi district. The final chapter is chapter six which presents major findings of the study, conclusions and otherwise some recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

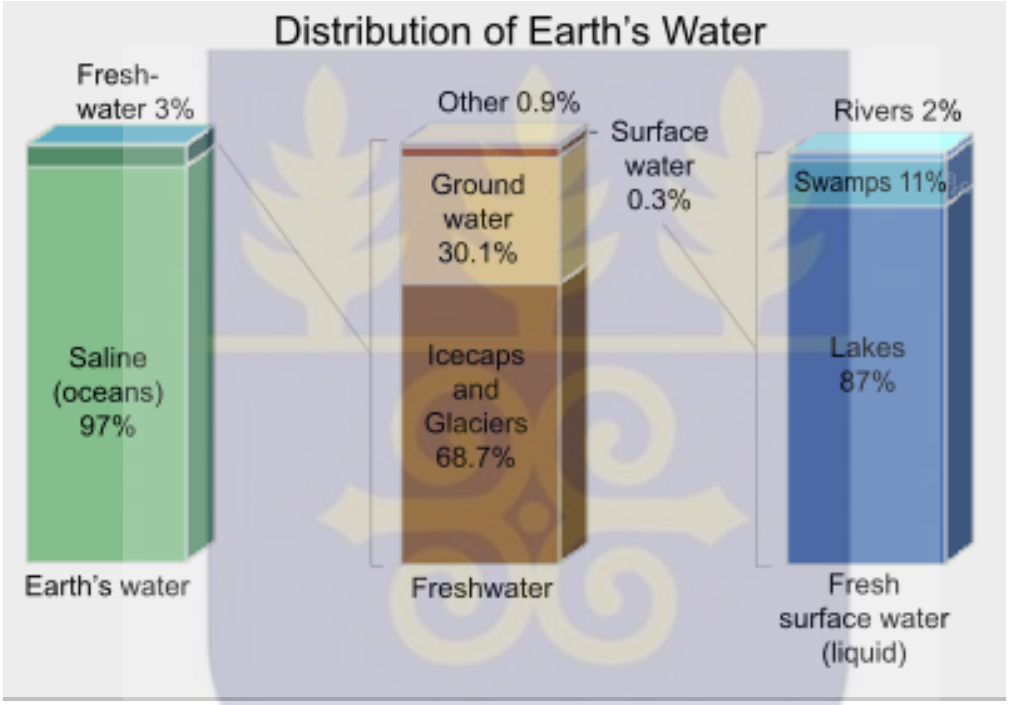
This chapter delves into the history, background and state of water resources management in Ghana. Before that however, a brief view has been given on the definition of water resources and water resources management in general. The main concentration of this chapter however is on the history and background of current water resources management policy, its current implementation on the world level as well as a critical assessment of the whole concept. More importantly, this chapter reviews the water resources management policies in Ghana before and after independence by taking a critical look at implementations, challenges and opportunities that have resulted from such policies.

2.1 Definition of water resources and water resources management:

Water resources are sources of water that are useful or potentially useful. MWRWH (2007), defines water resources as *"a general term encompassing the concepts of availability (location, spatial distribution, or natural fluctuations of water); accessibility (given availability, whether consumers can have water or can afford in adequate quantities); and quality (whether accessed water is free of contaminants and safe for consumption)*". Uses of water include agricultural, industrial, household, recreational and environmental activities. Water resources can basically be categorized into two, which are, salt or saline (oceans) water and fresh water. Salt water represent ninety percent of water on the earth and only three percent is fresh water, a little above two thirds of this is

frozen glacier and polar ice caps. The remaining unfrozen fresh water is found mainly as ground water, with only a small fraction present above ground or in the air. Below is the graphical representation of the distribution of water resources on the earth's surface.

Fig 2.1: Distribution of earth's water



Source: United States Geological Survey, 2008. Retrieved on 17th October 2013.

Fresh water is important because majority of human uses of water require fresh water. Sources of fresh water include surface water, under river flow, ground water, desalination (artificial process by which saline water, usually sea water is converted to fresh water) and frozen water.

2.2 Water resources management and development:

Management of water resources goes back to the attempts to battle seasonal changes in water availability in prehistoric times. As the era of hunting and gathering gave way to farming, water resources management became extremely important and even became more critical with the transformation of small villages into cities, industrial towns and administrative centres (Chene, 2009). Water management has never singled out to be an issue of technical intervention but is built within a great diversity of cultural, social and political settings (Chene, 2009). This meant protecting fields, cities and sacred places. As it was and still is, water management aims at ensuring water supply to places where water was/ is needed, when it was/is needed as well as getting rid of excess water or polluted water (UNESCO 2009).

Management of water resources therefore is about making effective use the available naturally given water sources (including surface and ground water) to satisfy the varying and often competing uses (domestic, agricultural, industrial as well as environmental) of water (Wallace et al.; Chene, 2009; UNESCO, 2009; European Report 2012).

The current water resources management crisis has however been blamed on the fragmentation of water management by sectors (Mukhtarov, 2007). It was noted by Jonch-Clausen (2004), that common critical water management issues in most nations included,

- *limited awareness on political level of water issues;*
- *and that institutions were centralised in nature with ''supply driven'' and fragmented subsectoral'' approaches to water management;*

- *there was the issues of general inability of governments in terms of their capacity level to manage pressures on water resources;*
- *inappropriate pricing structure, therefore limited cost recovery with its resulting effects being inefficient operation and maintenance of water systems;*
- *low level of investment in the water sector as well as less attention given to water resources management in national budgeting allocations;*
- *general lack of information and data to support proper management of water;*
- *and finally there was the issue of the often inadequate economic, social and environmental criteria for the approval of policies and projects* (Jonch-Clausen, 2004:3).

The need to find appropriate ways to co-ordinate policy making, planning and implementation in an integrated manner across sectoral, institutional and professional boundaries and at the same time promoting global, regional and country water coordination became eminent (GWP, 2000; Hassing et al.,2009, Jonch-Clausen, 2004). These ideas gave rise to a worldwide accepted water resources management framework which has a holistic view of water resources management and therefore a management framework known as Integrated Water Resources Management (IWRM) gained global attention in the 1990s (Essaw, 2007).

2.3 Integrated approaches to water resources management:

The competing needs of water for its diverse uses points to the urgent need to safeguard water for the livelihood of the world's increasing population and the protection and conservation of the resource to sustain its functions and characteristics (Essaw, 2007, Wallace et al.,2003). It was for this reason that the United Nations in 1992 adopted

integrated water resource management during the international conference on water and environment held in Dublin (GWP, 2000).

It was interesting to find out from Varis et al., (2008) that the philosophy of IWRM has been around in various forms for several decades and that there have been a lot of attempts to IWRM in different regions of the world over decades. They claimed that many trace the roots of IWRM to the 1940s as the Tennesse valley authority was set up to develop water resources of the region. They stated however that the roots of IWRM go far beyond that as in many countries, water resources management has been institutionalised in a more advanced and integrated manner long over centuries. Evidently, Embid (2003) (cited in Essaw, 2007, Varis et al., 2008), stated that integrated water resource management can be traced in Valencia, Spain, for example where multi-stake holder participatory water tribunals have operated at least since the tenth century and Spain was probably the first country to recognise water management on the basis of river basins as it adopted the system of "Confederaciones hidrographicas" in 1926 but IWRM has only been made popular recently by the UN's GWP.

Integrated water resource management according to Global Water Partners (2001:1) is:

'The process which promotes the co-coordination, development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems'.

The framework is based on four universal principles formulated in 1992 during the international conference on water and the environment. These principles cover social, political and economic issues at hand:

- *Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment*: effective management of water resources demands a holistic approach, connecting social and economic development with protection of natural environment.

- *Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels*: Participation is the voluntary contributions by people in a project and or dialogue between the local people and project preparation, implementation, monitoring and evaluation (Chambers, 2002). This involves raising awareness of the importance of water among policy makers and the general public. This means that decisions are taken at the lowest level, with full public consultation and involvement of users in the planning and implementation of water projects. Stake holder participation is minimal particularly at the local level. Effective participation is only possible if the governance structure inculcates that kind of behavior change, where all stakeholders will be given the opportunity in the decision-making process (UNW, 2011).

- *Women play a central part of the provision, management and safeguarding of water*: this essential role of women as providers and users of water has seldom been incorporated in institutional arrangement for the development and management of water resources. For instance, in Bangladesh, Ghana, Burkina Faso, Uganda and many other developing countries, hardly do women have the opportunity to express their opinion on water management issues that essentially affect their lives. However, this situation is quite the opposite in some developing countries such as Puerto Rico which has a history of women being involved in decision making processes.

- *Water has an economic value in all its competing uses and should be recognized as an economic good*: it is important first of all to recognise that it is the fundamental human right of all humans to have access to clean water at an affordable price. However, past failures to recognise the economic value of water has led to wasteful and environmentally damaging uses of resources.

The UNW-DPC writes:

''better use of pricing and fiscal instrument, for example, full cost accounting for water is essential: water is currently only priced and the point of consumption but a full valuing of water in our natural infrastructure is needed. After we use water, what happens? Once humans have used water there is a cost to cleaning it prior to returning it to the ecosystem. So many coastal zones are badly polluted with waste water and the full economic costs of this pollution for fisheries, human health, and recreation are simply not captured by current economic system'' (UNW-DPC, 2011; 4)

Managing water as an economic good is therefore an important way of achieving efficient and equitable use of water, conserving as well as the protection of water resources (GWP, 2000).

So by inference, IWRM according to Medema et al., (2008), will:

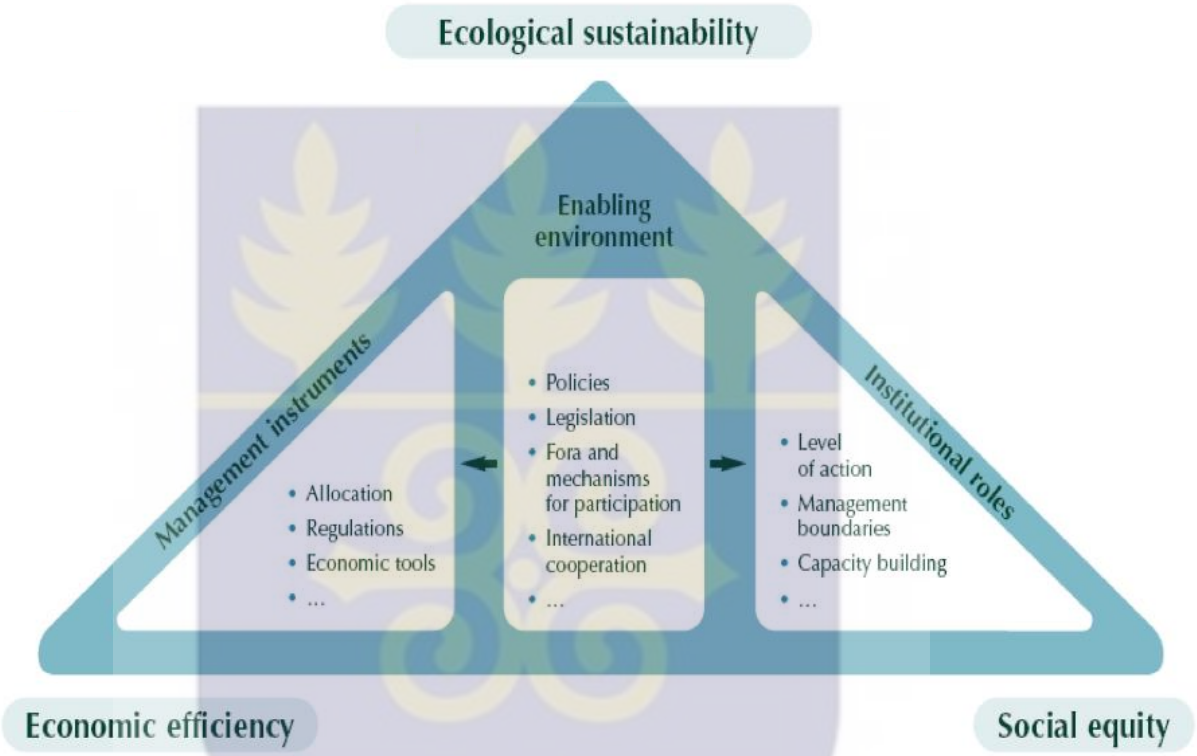
- Constitute managing water resources in a sustainable manner;
- Improve the management of water resource in a sustainable manner;
- Make more meaningful the complex interactions between human and ecosystems;
- Ensure the maximisation of economic and social benefits gained from water and land resources; and
- Reduce disruption to the water cycle and to equally dependent ecosystems.

Integrated water resources management has thus become a universal framework believed to be able to help resolve the global water resources management problems, in that the approach promoted authentic participation of all stakeholders. IWRM has for instance been adopted for its relevance in relation to the efficient production of food crops in irrigation agriculture, for its assistance in reducing water-related health risks, and its essential role in reducing risks of floods and droughts (Hassing et al., 2009; Varis et al., 2008; Saravanan et al., 2009). IWRM also creates the political opportunity for national and across boundary communities to democratically and consensually ensure the use of resources for livelihood, while at the same time ensuring the sustainability of resources(Saravanan et al., 2009). This approach which has been widely acclaimed by many international bodies, such as International Water Management Institute, the FAO and the World Bank, and regional bodies presents an opportunity for many nations to initiate policies that will protect environmental resources and at the same time alleviate poverty especially in developing countries (Saravanan et al., 2009).

It has been widely agreed by scholars that the implementation of IWRM depends on a range of factors which include, putting in place identifiable institutional roles to avoid conflicts of interest; an enabling environment to facilitate appropriate policies, strategies and legislations for sustainable water resource development and sectoral linkages for effective management; putting in place institutional frameworks through which policies and strategies can be carried out; the participation of community members especially women in the planning, implementation and management of water resources; and setting up the management instrument required by all stakeholders to do their job (Fig 1)

(Saravanan et al., 2009; Jonch-Clausen, 2004; Hassing et al., 2009; Essaw, 2007; Mukhtarov, 2007).

Fig. 2.2: Conceptual diagram of IWRM



Adopted from GWP, 2001

GWP recognises resources in their entirety and advocates for policies that will ensure systems of coordination between institutions active in the water sector to integrate under the umbrella of an enabling environment. Simply, for IWRM to be effective, there is the need for coordination between the statutory public actor and other water related agencies in the planning and execution of water resources management strategies and processes (GWP, 2000). Coordination in this sense is *"a social process that involves mobilising a sufficient number of people for enterprising activities* (Saravanan et al, 2009:81). This is

when different actors supply a pool of wide knowledge base in the designing and implementations of policies and strategies in a consensus manner.

It was reviewed that such policies aimed at coordination are 'exploited and negotiated' by various stakeholders (state governments, ministries, departments, regional governments, NGOs, user groups and village heads). In some cases, there has been the issue of centrally formulated guidelines which is contrary to the decentralised form propagated by IWRM.

In addition, institutional capacity building is very essential in integrating water resources management. This includes the training and awareness programmes and effective funding. The government body plays an integral role in directing the process of stakeholder coordination in ensuring the supply of safe and reliable water as well as the sustainability of ecosystems (Saravanan et al., 2009).

Participation or involvement of community members in the implementation and management of water resources and projects is an essential part of the whole process of IWRM. Community participation in this regard refers to the involvement of community members (people in a geographical setting with a common boundary) in projects that are meant for them, in other words, projects that affect them (Essaw, 2007). Participation of community members in water resources management has been closely related to equity especially in developing countries in that IWRM programmes focus on the weaker sections of the society- the poor, the landless and most especially women because it is perceived that women play central role in the 'provision, management and safeguarding of water' (Essaw, 2007; UNW-DPC, 2011).

However, the general acceptance of IWRM as the ideal water resources management practice has met a lot of criticisms ranging from its definition, evidence and capacity (Medema et al., 2008) and has even been viewed by some authors as an issue of "following the crowd" as the story of the 'Emperor's new clothes' by Hans Christian Anderson. That is, the concept has become only fashionable in the field of water resources management (Stucki, 2011). To some, the concept remains ''elusive and fuzzy'' (Medema et al, 2008), with others going as far as suggesting that IWRM has degenerated into a ''buzzword'' with different meanings (Jonch-Clausen and Fugl, 2001, cited by Medema, 2008).

Saravanan et al., (2009; 1) emphasized that *most critics argue that the domain of water resources management is a political process of contestation and negotiation, the emphasis is on complexities, contextuality, power dynamics and the importance of Analysing real world situations*. They demonstrate how integration cannot be achieved given power dynamics of social interactions (Saravanan et al., 2009:78).

Also, while there is worldwide consensus on essentiality of the involvement of all stakeholders for a communicative rationality, it has not been clearly stated who should be involved, how to facilitate the coordination among these stakeholders, and how stakeholders should integrate (Saravanan et al., 2009). Jonker (2007) believes the implementation of IWRM is complicated because it is not fully appreciated that although IWRM is derived from international discourse on water management, it is reshaped by *local political imperatives*. In that current conceptualisation of IWRM is not sufficient to facilitate implementation because it does not incorporate the inevitable political process.

In reply to comments such as that of Jonker, the GWP (2000) as the chief proponents of IWRM, have stated that 'different nations and states will find different ways of implementing the IWRM process, be at different development stages, and therefore will derive different benefits' (GWP-TAC, 2000, Jonch-Clausen, 2004). Medema et al.,(2008) observe that, this statement, although honest, could be viewed as weakening the proposed outcomes of IWRM implementation by providing a means of explaining away any failure to achieve expected outcomes from implementing IWRM program as the consequence of ''local conditions'' '(Medema et al., 2008).

Jonker (2007) further added that implementation of IWRM has been elusive because the conceptual basis is not clear and that the GWP definition does not provide the theoretical clarity required for practitioners for successful implementation. Medema et al., (2008), believe that, there has never been an establishment of any agreed definition of IWRM, nor has there been a fully addressed answer as to how implementation should be done. They however acknowledge that water resources management concepts are far too complex for a single, usable definition for IWRM. Biswas (2004), in his publication "Integrated Water Resources Management: A Reassessment", asserts that, at a first glance, the concept of IWRM looks attractive but a deeper analysis brings out how the concept will be exceedingly difficult to be made operational. He asks some fundamental questions about the definition of IWRM in terms of its possible implementation in the real world. He asks,

- *"promotes- who promotes this concepts? Why should it be promoted and through what processes? Can the promotion of an amorphous concept be enough to improve water management? (*Biswas, 2004; 248).

- *"land and related resources"- what is meant by "related resources"? Does it include energy, minerals, fish, other aquatic resources, forests, environment, etc.? Considering the intense inter-ministerial and intra-ministerial rivalries that have always been present in all countries, how can use, development and management of such resources be integrated, even if this was technically possible? Is this realistically feasible? ……..(*Biswas, 2004; 248).
- *"maximize"- what specific parameters are to be maximised? What process should be used to select these parameters properly…..(*Biswas, 2004; 248).
- *"economic and social welfare''- what exactly is involved in terms of determining economic and social welfare? Even the economists and sociologists cannot agree as to what actually constitutes economic welfare, except in somewhat general and broad terms or how can they be quantified? (*Biswas, 2004; 248).
- *"equitable"- what precisely is equitable? How will this be determined operationally? Who decides what is equitable, from whom, and from what perspectives? (*Biswas, 2004; 248).
- *"sustainability"- what is meant by sustainability, which itself is a vague word, and also as fashionable as integrated? How can sustainability be defined and measured in operational terms? (*Biswas, 2004; 248).
- *"vital ecosystems"- what exactly constitute vital ecosystems? How can "vital" and "non-vital" ecosystems be differentiated? Can even such a differentiation be made conceptually let alone operationally?" (*Biswas, 2004; 248).

He goes on to say that, "*for all practical purposes, most international institutions have endorsed this concept, either explicitly or implicitly" (*Biswas, 2004; 248). *This is in spite of*

*the facts that there is no agreement at present among the same international institutions that endorse it as to what exactly is meant by integrated water resources management, or whether it has been possible to use this concept to improve water management practices which would not have occurred under normal circumstances, and without any explicit use of this concept, or in which countries it has been possible to apply this concept successfully; and, if so, under what conditions, over what periods, and what have been its impacts (positive, negative, and neutral) on human lives, the environment, and other appropriate development indicators; and how, or even whether, the concept can be implemented in the real world. (*Biswas, 2004; 249)

Ironically, Biswas (2004), believes that many of the water problems have already become far more complex, interconnected and too large to be handled by any one single institution, irrespective of the authority and resources given to it, technical expertise, management capacity available and level of political support. He acknowledges that water problems will continue to become increasingly more and more complex and intertwined with other development sectors like agriculture, energy, industry, transportation and communication and with social sectors like education, environment, health and rural or regional development in that water can no longer be viewed by one institution. These factors that he pointed out are exactly what IWRM aims at doing. Saravanan et al., (2009) offer some hope by expressing categorically that "*IWRM has taken a normative approach of 'how to integrate' with diverse connotation, -various definitions, - and different approaches*. However, the expression of the need for a place-based nexus where different actors or stakeholders in a hydrological unit can make decisions together is a commonality among these approaches.

As stated earlier, IWRM operational approaches involve applying knowledge from various disciplines as well as the insights from diverse stakeholders to devise and implement efficient, equitable and sustainable solutions to water and development problems (GWP, 2004).

2.4 Integrated approaches to water resources management experiences across the world

This section draws experiences and insights from the UN Water's 2012 Status Report on the Application of Integrated Approaches to Water Resources Management. Under the UN-GWP's IWRM, the UN-Water survey of 130 countries in May, 2012 established that over 80% of countries have reformed their water laws in the past twenty years as a response to growing pressures on water resources caused by expanding populations, urbanization and climate change. The survey focused on progress towards the implementation of IWRM and was co-ordinated by UNEP on behalf of UN-Water. The report also focused on the status of water resources management in UN member states, identifies and suggested barriers to progress and strategic ways in which these barriers could be overcome. Governments were asked for feedback on governance, infrastructure, financing and other areas related to water management to gauge how successful countries have been moving towards IWRM. It became evident that countries have demonstrated their commitment to policy and programmes (UN-Water, 2012). Specifically, the study focused on:

- Policy and legal framework
- Governance and institutional frameworks
- Management instruments and;

- Infrastructural development

Interestingly the survey showed that the introduction of IWRM on a national level varies greatly across the globe, from early planning stages to concrete implementation of new laws and policies.

However, many countries, particularly those in developing regions signalled a need for increased capacity-building, investment and infrastructure development in order to fully implement integrated water resources management. Below are some specific findings from the survey

Policies, laws and plans: The introduction of IWRM has mandated the policy reforms, adjustments of water legislation and water resources planning. Seventy eight percent (78%) of countries at the global have made significant changes in their water policy, 50% out of which have fully implemented the policy. Eighty two (82%) of countries have made changes in water laws with implementation completed or at an advanced stage in 55% of countries. The survey highlighted that countries such as Pakistan, Sri Lanka, Namibia, Cameroon, Costa Rica, Barbuda and Antigua faced challenges with respect to agreement on new policies/laws that reflected IWRM approaches or have adopted new laws that remained far from IWRM core values as in the case of Mexico. Others such as Brazil, Australia who have complex federal and state structures have been able to agree and establish reforms (UN-Water 2012).

Jamaica, Bangladesh, Tunisia and Armenia who have advanced with their water policies and laws are likely to struggle with operationalisation at full scale with the issue of 'integrating' water resource management with respect to stake holder participation and water related agencies. There was also the issue of contestation of new policy formulation

of major stake holders in the water sector, political parties as well as civil society organisations due to the consultation approach adopted in the display of political documents in Sri Lanka. In Costa Rica, IWRM has so far remained a 'reference' document. Tunisia faces the major challenge of 'fragmented actions' caused by inter linked factors ranging from the lack of integration of water policies, minimal stake holder participation and inadequate political engagement leading 'fragmented actions'.

With regards to coordination in development planning, between water managers and various development planners, which in the central objectives of IWRM, 67% to 79% of countries reported to have included water in their plans. This was viewed with respect to three of the most widely used plans which were Poverty Reduction Strategies, National Strategy for Sustainable Development (UN-Water, 2012).

Tansboundary coorporation were not left out in the status report with a total of 54% of countries engaged in the implementation of transboundary agreement for their respective river basins although there were indications of huge disparities in the purpose and details of such coorporations/agreements. As anticipated, there were the issues of management constraints. Twenty five percent (25%) of the total number of countries for example, Mozambique, Republic of Korea, Angola and El Salvador, Congo, Costa Rica and Australia reported that they faced management constraints with regards to legal frameworks and strategic planning. Often reported were that legal frameworks are either too weak or conflicting in some countries. Albania for example, wishes to adopt the EU Water Framework Directive but currently is under legal systems that have opposing views to the views of the EU (UN-Water, 2012).

Traditional practices and customs also conflict with national laws in Peru and Samoa. DR Congo reported to lack clearly defined national water policy. Germany, Denmark, Lithuania and Portugal faced challenges in balancing the factors which are principles of IWRM, which is keeping the balance between agricultural, industrial and environmental interests UN-Water 2012).

Governance and institutional framework: this structure which forms the central philosophy of IWRM reflects decentralisation in that water resources should be managed at the 'lowest appropriate level'. This means the active involvement of various stakeholders in decision makings on allocation and management. The survey reported that 71% of countries have started implementation at this lowest level management and 51% of which had advanced or completed in cross sectoral management and decentralised (public and NGOs) management of water. It was however noticed that countries with very high Human Development Index (HDI) level have been able to implement institutional reforms quickly than others. Thirteen percent (13%) of the total countries surveyed however considered this reform not relevant to them. Specifically, it was reported that new structures for water management have been put in place in many countries. The report clearly inferred variations according to local conditions.

In Uganda, Albania, United Republic of Tanzania, Brazil, Armenia and Cape Verde, it took a while for new structures and coordination systems to become fully blown. Uganda has overtaken the others by achieving some higher level of integration. Armenia, Samoa and China are low on this ladder. From the report, one of the most common on-the-ground practical issues is the challenge of integration ranging from the reluctance on the part of ministries on information sharing or the possibility of sector driven resources

management plans as in the case of Bangladesh, Jordan, China, Samoa, Tunisia, Armenia and Jamaica. Uganda, Mozambique, Brazil, and Australia have provided some hope on successful integration but not without a few problems. In Australia, coorporation at the lowest level is usually more difficult than at the lowest levels of basin management. In Spain also, decentralisation of decision making have often confused administrations involved in terms of specific objectives and roles (UN-Water 2012).

Stakeholder participation: Stakeholder participation covered different aspect from access to information, involvement of general public and private sector in water resources management. This study arrived at the disappointing fact that most countries except with high HDI, were making very slow progress in this matter with Africa falling behind. On the other hand, almost all countries consider access to information as an essential component in this issue and progress has been made especially in stakeholder access to information. With respect to gender issues, surprisingly, 22% of countries saw gender mainstreaming in water resources as not relevant and that only 21% of countries have achieved the state of advanced or full implementation (UN-Water 2012).

Also, evidence indicated stakeholder involvement had led to improved outcomes in Bangladesh, Brazil, Estonia, Ghana, United Republic of Tanzania but Australia (indigenous communities), Brazil and Cambodia faced difficulties. In Pakistan, Mozambique and Tanzania faced the problems of stakeholders involving policy threats to existing power relations and limiting participation to consultative role rather than a deliberative role. It was realised in Ghana that communities are prepared to participate and take charge for their water and sanitation problems through water and sanitation committees (UN-Water 2012).

Capacity building: This covers capacity needs at the national and sub-national levels, capacity building programmes for institutions and individuals as well as research programmes. Thirty five percent (35%) of countries have advanced level of actions across most of the capacity building areas whiles the rest of countries may be active only in a few capacity areas. Capacity constraint and slow progress are evident from the responses with Albania, Armenia, Costa Rica, Guatemala, Bangladesh, Ghana, Namibia, and Rwanda. There was the issue of overlapping or undefined responsibilities between various management organisations in Benin, El Salvador, Botswana, Brazil, Tajikistan, Panama, Guinea, Montenegro and Brazil (UN-Water 2012).

These often unclear or overlapping responsibilities lead to competition and management conflicts. Challenges in coordination and coorporation between management organisations even in areas with clear or defined responsibilities were recorded in Greece, Cambodia, Uganda and Panama. Algeria, Bosnia, Guinea, China, Serbia, Saudi Arabia, Libya, Nicaragua and Herzegovina reported problems of human capacity (numbers and knowledge), lack of sufficient or appropriate equipment and technology(UN-Water 2012).

Management instrument: management instruments simply refer to tools and methods that countries apply their activities to enable and help decision makers to make 'rational and informed choices between alternative actions'. These range from financial, infrastructure and resources as well as services. From the report, some management instruments attract a higher priority than others. Water resources assessment is being implemented by over 60% of countries surveyed (UN-Water 2012). Over 50% of low and medium HDI countries lacked any management systems for assessment of their existing

water resources. Knowledge sharing, reported by most countries, scarcity of information which often resulted from lack or inadequate research and data management constraints ranging from archiving, access and dissemination. Countries which have made some forms of improvement in this matter include Uruguay, Brazil, Mozambique, Estonia, Benin, Costa Rica, Armenia and China although there have been less mechanisms put in place for measure performance and for management of knowledge as well as cross agency information sharing as in the case of Estonia, Costa Rica, Bangladesh, Uganda, Armenia and Samoa (UN-Water 2012).

Financial instrument: Financial instruments are being implemented in less than 50% of countries surveyed, although there is a huge disparity between HDI groups. Less than 10% of the low and high HDI groups have reached and advanced stage of implementation financial instruments though. In some countries, payment for water use is seen as economic instrument to change water use practices. This include water tariffs as part of national program for water saving agriculture in Tunisia and water charges used for improved water use efficiency and reduced pollution in Estonia. Some countries also indicated various management instruments in place but lack the capacity to implement them effectively as in the case of Pakistan, Namibia, Cape Verde, Ghana, Guatemala, Brazil and Namibia (UN-Water 2012).

Infrastructure development: Water infrastructure and the necessary finance, has been included or being included in national infrastructure investments plans of more than 70% of countries surveyed. Actual infrastructural development progress or full implementation level was high in a number of countries in terms of water supply (67%) and energy/hydropower (53%) and low in a number of countries for rain water harvesting

(19%) and natural systems (22%). Countries making specific attempts at priority water infrastructure development include Uruguay, Sri Lanka, Mexico, Rwanda, Jamaica, Guatemala, Costa Rica, Estonia, Uzbekistan, Pakistan and Costa Rica (UN Water, 2012). Saravanan et al., (2009) have however argued that UN-Water seeks to assess "commitments as progress" to practice IWRM in nations, but assessment as these, probably may not incarcerate the "core functions of integration" ("co-ordinated development, maximising socio-economic development and sustainability of vital ecosystem"), which critics normally focus on. They added though that there has been some visible amount of change from the traditional state-centered approaches to water resources management in their review of IWRM implementations in Australia, India, Zimbabwe, South Africa, Mexico and Brazil (UN-Water 2012).

Saravanan et al., (2009) illustrated that assessment in both developed and developing countries lacks efficiency in terms of recognizing "failure in the contemporary approach of IWRM". Often evaluations in developing countries (Mexico, Zimbabwe, South Africa and India) present mixed conclusions on the effectiveness of water shed programmes; inadequate stakeholder participation; and implementation difficulties in Latin America. Evaluation in developed countries such as USA and Australia indicate that collaborative watershed management consumes a huge amount of resources, and take a lot of time, risky and difficult (Saravanan et al., 2009).

In India for instance, water related sectors or ministries (Ministry of Agriculture, Ministry of Rural Development, and Ministry of Environment and Forest) show their adaptation of IWRM and democratic decentralisation through their ministerial objectives and goals. These ministries state clearly the 'integrated, holistic, and participatory approaches' for

watershed development in their individual ministerial policy agenda, to cater for each ministry's programmes for agricultural development, watershed management, afforestation and poverty alleviation (Saravanan et al., 2009).

This has however brought about the development of different plans for the same administrative region under the jurisdiction of different ministries and its resultant effect has been the issue of competition. There has also been an issue of centrally formulated guidelines which is not in line to the attempts at decentralisation. Stakeholder participation has been the usual top-down approach where the national government determines who the actors are, how the allocation of financial inputs should be done and the extent of watershed structures (Saravanan et al., 2009).

Literature reviews that South Africa's National Water Act, 1998 is classified to be one of the 'most progressive pieces of reform', unfortunately, the attainment of its set objectives of equity, efficiency and sustainability has been elusive. The cause of this has been pointed to the fact that, stakeholders often give different interpretations on what constitute IWRM, and how its goals and objectives can achieved through the best means (Jonker 2007, Saraanan et al., 2009)

Similarly in Zimbabwe, institutional structures at the watershed were established across the country within a period of six months after the Water Acts (1998). There has however been the issue of inadequate funding. In this country, IWRM basically depends on international donors, whose withdrawal had an adverse effect on the performance at the community level.

Struggle between centralisation and decentralisation attempts has evidently been the case with the implementation of IWRM in Latin America. Scott and Banister (2008) (cited by Saravanan et al., 2009) assert for instance that in Mexico, the allocation of financial resources is centrally rooted in Mexico City, and this presents an 'opportunity with centralised autonomy within official institutions demanding public participation'.

In Australia, the lack of transparency in stakeholder selection has been reported in New South Whales where non-supporters of the state ruling party are excluded in the catchment management (Saravanan et al, 2009).

In spite of the issues that come up in terms of the practice of IWRM, most researchers (Essaw, 2007; Medema et al., 2008; Jonker, 2007; Jonch-Clausen, 2004; Saravanan et al., 2009) have argued that integrated water resource management aims at optimizing the available natural water flows, including surface water and groundwater, to satisfy the competing uses of water. Improving water management can make a significant contribution to achieving the eight Millennium Development Goals established by the UN General Assembly millennium meeting in 2000 (Gonzalez 2005, as cited by Essaw 2007). For instance:

- There cannot be an eradication of extreme poverty and hunger when the world's population survive on agriculture which in turn depends on our most critical and finite resource-water. We cannot talk about feeding more people without water. Water is very essential in income-generating activities such as vegetable and livestock farming. Income gained from such activities serve as supplement to incomes at the household level (Yankson, 2007).

- There cannot be any meaningful achievement in universal primary education when children spend time searching for water other than being in school.
- There cannot be a reduction in child mortality as well as an improvement in maternal health when pregnant women, nursing mothers, infants and children are exposed to contaminated water.
- Combating malaria and other diseases will depend on better management of water to reduce mosquito habitats and malaria incidence, and also reduce incidence of range of diseases where poor water management is a vector. Improved health and nutrition which largely depends on safe and reliable water supply will reduce susceptibility to HIV/AIDS and other major diseases.
- Improved water management, including pollution control and sustainable levels of abstraction are key factors in maintaining healthy ecosystems.

2.5 Water Resources Management in Ghana:

Water resources in Ghana include saline (ocean) water and fresh (surface and underground) water (Adjomah, 2010). Although seasonal shortages of water are common in the country, Ghana is undoubtedly endowed with perennial rivers and groundwater. The mean annual rainfall ranges from 2 150 mm in the extreme southwest of the country, reducing progressively eastwards and northwards to 800 mm in the southeast and about 1000 mm in the northeast of the country (MWRWH, 2009, 2011). Surface water bodies dominate Ghana's water resources which include the Volta basin (which consist of Oti, Daka, Pru, Sene, and Afram rivers as well as the black and white Volta rivers), the southwestern basins (comprising Bia, Tano, Ankobra and Pra rivers), and the coastal

basins river systems (the Ochi-Narkwa, Ochi Amissah, Ayensu, Densu and Tordzi which respectively cover 70, 22 and 8 percent of the total area of Ghana (MWRWH, 2011).

The Volta River system is shared with Côte d'Ivoire, Burkina Faso, Togo, Benin and Mali. Two river basins in the southwestern system are also transboundary – the Bia River is shared with Côte d'Ivoire, while the lower reaches of the Tano river form part of the boundary with Côte d'Ivoire. The total annual runoff of the river basins is 56.4 billion m3. The Volta, southwestern and coastal systems contribute 73.7, 29.2 and 6.1 percent, respectively, of the annual runoff originating from Ghana (Ministry of Works and Housing, Ghana, 1998).

Groundwater resources of Ghana can be found in two main rock formations: 1) the sedimentary formation which are of Voltaian origin, and occupies about 43 percent of the total area of the country, with yields of 1.0 to 12.0 m3/ha at depths of 20 to 80 m; and 2) the non-sedimentary formation consisting mainly of the crystalline basement complex of pre Cambrian origin, and occupies 57 percent of the total area of the country with yields of 1.5 to 32.0 m3/ha at depths of 20 to 100 m. Quality of groundwater resources in Ghana, according to the Water Resources Commission (2000), is fairly good with the exception of a few cases of some localized pollution with high levels of iron and fluoride, as well as high mineralization with total dissolved solids, especially in some aquifers along the coast of the country (Water Resources Commission, 2000).

Water resources management in Ghana covers both customary and formal laws (Dei, 2011). Customary laws and practices have been in existence over the years. Before the creation of formal water resources management agencies, customary law was the regime

through which water resources management and supply was provided to people living in rural areas of Ghana. Major sources of water in the customary/traditional regime are wells, streams, rivulets, and rivers in that order of importance (Mensah, 1999). Water in its visible form such as rivers, lakes or the sea cannot be owned by an individual as a privately owned property. It is also however, unclear whether it is public property. In some communities, surface water is public property and shared by all members of the community and even members from other communities and in others, it belongs to the chief or king. In reality, the king holds the water in trust for his people. In other communities, water is said to be 'ownerless'.

Generally, a private person will never be allowed to purchase or own a surface source of water (Mensah, 1999). For example, under Akan customary water law, surface water is considered community property which can never be individually owned even in situations where a stream or a pond is naturally situated on or close to somebody's land. In a nutshell, under customary law, water is a free common good, everyone is entitled in principle to its uses as a common good (Dei, 2011).

Under customary law, water from natural and public sources is available free of charge. As long as water is available, a person is not denied access to it. The problem with the customary regime is that water from traditional sources is not available all year round. It is also the source of many diseases and very difficult to increase the supply of water to meet increased demand as populations grow.

Customary laws covered the areas of water conservation, pollution control, protection of catchment and protection of fisheries. These were embedded in kinship reverence for

ancestors and belief in spiritual powers of the earth based on the belief that the earth has a spirit of its own, which can be helpful if propitiated or harmful if degraded (Odame-Ababio, 2002). However, ancestors were believed to be the immediate spiritual custodians of the land and its resources and it was the ancestors, on behalf of the earth deity who kept watch to see the land was appropriately used (Opoku-Agyeman, 2001, cited by Odame-Ababio, 2002).

There was also the belief in river gods, tree deities and sacred groves. People were forbidden to hunt in certain periods of the year or fish on Tuesdays, and were cautioned against farming along river banks, which were considered the resting abode of the river gods and children. Fetish priests and priestesses acted as law enforcement agents and carried out sanctions on offenders. Only a little, almost invisible, trace of this peculiar practice can be found today as priority is given to water for domestic use above anything else (Odame-Ababio, 2002). As a result of population growth, many human settlements are now close to water sources. Poor land use methods have destroyed the water courses and the environment in general. Mining and other industrial activities have polluted water bodies. Generally as the populations became educated and less homogeneous, taboos and religious sanctions that form the basis of the punishment under the customary regime became less relevant.

2.5.1 Pre-independence Common Laws:

The need for the government to recognize water resources management and use came as early as the 1900s. The first attempt was evidently the enactment of the River Ordinance (CAP 226 OF 1903) to comprehensively regulate the use of water, other than for domestic use. The section then of this ordinance states that it shall be unlawful to pump,

divert or by any means cause water to flow from a river, for purposes of irrigation, mines or factories or to generate power, without a license from the Minister.

Incidentally, there was no continued action to this ordinance, neither was regulations made, and the ordinance was antiquated eventually by time and overtaken by other enactments. The other enactments that sequenced contained clearly defined provisions that enabled agencies to perform certain specific functions, some of which were water related. For example, the Forestry Ordinance of 1927 made provisions for catchment protection and control of water obstruction in forest reserves; the Land Planning and Soil Conservation Ordinance of 1953 had sections for checking soil erosion and for the control of water courses (Ministry of Works and Housing, 1998 cited by Odame-Ababio, 2002).

2.5.2 Post-independence common laws (the National Water Legislation

This era was characterized by the need to put in place agencies and institutions which were mandated specifically to control water supply, irrigation and environmental management. However these attempts were sector-specific. Each sector agency managed, controlled and regulated its own activities with respect to water management, with little coordination and control (Adjomah, 2010). Even when institutional frameworks were developed for coordination, they were usually based on top-down command and control approach. For example, the Ghana Water and Sewerage Corporation (GWSC), now the Ghana Water Company Limited (GWCL), developed, managed and controlled drinking-water supply and, to a very limited extent, sewerage services; the Volta River Authority uses raw water to produce electricity; the Irrigation Development Authority (IDA) develops and manages irrigation and associated land use for agricultural production; and

the Environmental Protection Agency (EPA) concerns itself primarily with the environmental implications of water treatment and usage.

Subsequent water sector reviews identified institutional gaps regarding the coordination and integration of the various sector policies for water use in the country (Odame-Ababio, 2002). Aside the issue of no effective regulation of the water sector, these institutions pursued their individual responsibilities with little or no coordination and without any integration of economic and water conservation ideas (Mensah, 1999).

As a result, water resources management sector in Ghana since the late 1980s and early 1990s has undergone some important changes, some of which were 1. The establishment of a rural water and sanitation strategy based on community ownership and management. 2. The restructuring of the urban water sector to bring in private sector participation in urban water delivery. 3. Preparation of the National Environmental Action Plan and 4, the strengthening of water resources information agencies, etc. The most significant of these was the division of the Ghana Water and Sewerage Corporation (GWSC) into Ghana Water and Sewerage Corporation and the Community Water and Sanitation Agency (CWSA) (Mensah, 1999).

As stated earlier the Ghana Water and Sewerage Corporation (GWSC) was set up in 1965 and has the authority as a public corporation to provide, distribute and conserve water for domestic public and industrial purposes in urban areas under the section 4 of GWSC Act 1964, Act 310. This institution is also mandated to manage sewerage in Ghana by establishing mechanisms to control and operate sewerage systems. Under the LI 1233, the GWSC has established regulations to cater for the provision of water and sanitation

facilities to Ghanaians (Mensa, 1999). The GWSC currently deals with about 87 cities and towns in Ghana (Yankson 2007). The GWSC has now been turned into a limited liability company, Ghana Water Company Limited (GWCL) to facilitate partnership with the private sector in urban water supply.

The creation of the Community Water and Sanitation Agency came about as a result of the failure of the Ghana Water and Sewerage Corporation to make water and sanitation facilities available to all Ghanaians. This failure came about as a result of the concentration of GWSC on urban areas (Mensah, 1999). The CWSA was therefore established in 1994 as an autonomous division of the GWSC to facilitate the provision of water to rural areas in Ghana. However, the CWSA later became an institution in its own right and is no longer a division of GWSC by Act 564 (Mensah, 1999).

It was established with the mandate to act as a facilitator for the delivery of water and sanitation facilities and hygiene education to rural communities and oversee the accelerated provision of potable water and hygienic sanitation facilities in a congenial environment in rural areas.

- Part of the responsibilities of the CWSA is to facilitate the provision of safe water and sanitation services to rural communities and small towns (Section 2 of Community Water and Sanitation Agency Act, 1998, Act 564) (Odame-Ababio, 2002).
- The CWSA must also provide support to district assemblies in providing sustainable safe water service delivery to rural areas (Odame-Ababio, 2002).

- It must as well support district assemblies to encourage participation of local community members, especially women in the management and construction of water facilities/projects (Odame-Ababio, 2002).
- The CWSA must also design strategies for the mobilization of resources for the development of water and sanitation facilities by encouraging private sector participation in the provision of water facilities (Odame-Ababio, 2002).
- It was coordinate the activities of NGOs involved in the provision of water, sanitation and hygiene education (Odame-Ababio, 2002).
- It is mandatory that the CWSA collaborate with Ministries of Local Government, Environment, Health, and Education in community sensitization about water related health hazards. It must also collaborate with the WRC, the EPA, GWSC and other public agencies as well as international agencies in the provision of water and sanitation services to rural communities in Ghana (Odame-Ababio, 2002).
- And finally, it was set standards for the provision of water and sanitation services by charging fees for service provision (Odame-Ababio, 2002).

The Community Water and Sanitation Programme is a demand driven programme and communities are expected to participate fully in the programme in order to sustain it. They are supposed to organise themselves by contributing financial and human resources to ensure the success of the programme. Consequently, only communities which are willing to contribute to part of the cost of providing the service (generally 5%) and who are ready to pay for the maintenance of the facilities provided, become part of the programme. The CWSA now works in close collaboration with District Assemblies and

is responsible for over 16,000 rural communities and 287 small towns (Yankson, 2007). It must support district assemblies in promoting sustainable safe water and sanitation services in rural areas.

2.6 Ghana's experience with Integrated Water Resource Management:

The establishment of Water Resource Commission, Ghana, was a giant step towards the implementation of IWRM in the nation's water resources management. This significant step was taken by government in 1996 to address the diffused state of functions and authority in water resources management and to put them into an integrated form. The Water Resources Commission (WRC) was established by an Act of Parliament (Act 522 of 1996), with the mandate to regulate and manage the country's water resources and coordinate government policies in relation to them.

The commission consist of major regulators and users in the water sector, and provides a forum for the integration and balancing of different interests.WRC is made up of technical representatives of key institutions involved in water utilization and water services delivery, i.e. Hydrological Services, Water Supply, Irrigation Development, Water Research, Environmental Protection, Forestry, and Minerals. Traditional chiefs, NGOs and women are represented to take care of civil society interests. These indicate that Ghana has adopted IWRM as its main management concept both at the national and local level and its activities include the allocation of water use permits, undertaking surface and ground water assessment, water quality monitoring as well as public awareness and education on good water management practices through the GWSA and the CWSA (WRC, 2010).

The frame work for National IWRM is developed based on actions embedded in the three pillars of IWRM:

a. *Enabling environment- establish policies, legislation, and financing*
b. *Institutional roles- organizational framework and institutional capacity building*
c. *Management instruments- technical tools for IWRM, efficiency in water use, regulatory instruments, water resources monitoring and information* (WRC, 2012; 41).

According to Water Resources Commission **(**1999, 2012), in practice, the Commission seeks to achieve the goals and pursue its responsibilities through:

- Adopting the process of Integrated Water Resources Management in the management and regulation of the nation's water resources.
- Establishing an adequate and cost effective organization, which can assist and guide the Government of Ghana in order to achieve the goals of Integrated Water Resource Management and monitor the achievements.
- Establishing good working relations with all stakeholders in the water sector.
- Inviting existing institutions and the private sector to participate, through outsourcing and contracting of specific tasks, in establishing its tools and procedures.

Since its establishment, WRC has developed short- and medium-term strategies for the management of water resources in Ghana. As part of these strategies, two river basins have been selected for pilot studies. These are the Densu basin in the south, which is a

major source of potable water supply to parts of Accra, the national capital, and the White Volta basin in the north, which is shared with neighboring Burkina Faso. According to the UN-Water (2012), forty percent of irrigation schemes for more effective water use and productivity have been rehabilitated.

According to the WRC (2012), implementation of IWRM in Ghana has however been with some key challenges which include:

- Inadequate enforcement of existing regulations and laws on permit conditions
- Inadequate regulations and control of industrial and domestic solid and liquid waste into water bodies
- Insufficient data and information availability and sharing on surface and ground water quality as well as quantity
- Climate change and climate variability impacts on water and natural resources are not given reverence and are insufficiently outlined and incorporated in sectoral water management strategies
- Ineffective regulations on activities have often led to catchment degradation and poor water quality. For example, buffer zone policy is not implemented)
- Early warning systems and mitigations of effects from floods and droughts are often inadequate
- Protocols with international boundaries like Cote d'Ivoire on the point of management of the Aby Lagoon-Bia-Tano basins system and with Togo shared groundwater resources are yet to be formulated

- Finally, there is also the issue of inadequate skilled human resources for IWRM at all levels (WRC, 2012).

2.7 General overview of National Water Policy and its implications:

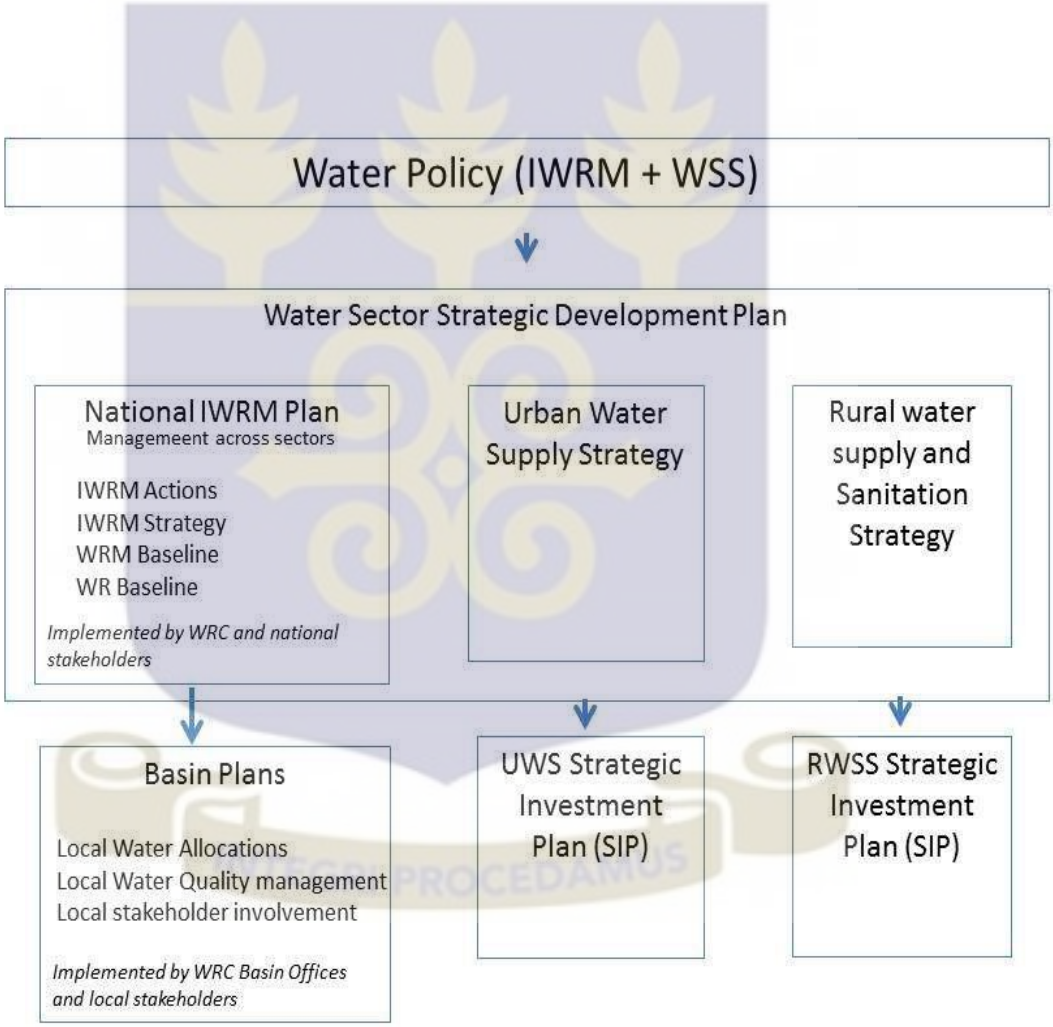
In Ghana, the national IWRM plan is seen as the context of the overall development planning, particularly in the water sector planning. The National Water Policy (NWP) was adopted in 2007 and covers the productive part of water sector (Water Supply and Sanitation) and the cross-sectoral water resources management part (IWRM). The NWP is firmly rooted in the principles underpinning the Ghana Poverty Reduction Strategy (GPRS), the Millennium Development Goals (MDGs) and the Africa Water Vision of the New Partnership for Africa's Development (NEPAD) (MWRWH, 2007).

This policy was developed with the vision to provide a framework for the *sustainable development of Ghana's water resources*. It covers all water users, investors, water managers, practitioners, policy makers and decision makers within the central government and decentralised (district assemblies) government structures, non-Governmental organisations and international agencies. The NWP also acknowledges the cross sectoral nature of water resources management as well as linkages to other relevant sectoral policies such as issues related to sanitation, energy, transport, agriculture, etc. (MWRWH, 2007).

The Water Sector Strategic Development Plan (WSSDP) as the implementation framework for NWP is made up of three basic strategic planning components, which consist of, i. the national IWRM Plan, ii. the Urban Water Supply and Strategy and iii. the Rural Water Supply and Sanitation Strategy. However, these plans and strategies vary

from each other in the sense that the focus of the IWRM framework is about establishing a cross-sectoral legal and institutional management functions at the national and basin level, whilst the water supply and sanitation components concentrates on investment infrastructure programmes for water development as shown in figure 3(WRC, 2012).

Fig 2.3: Strategy and Planning Frameworks within the Water Sector in Ghana.



Source: WRC, 2012

2.7.1 Institutional roles and coordination of the water sector under the National Water Policy:

From the discussions, it has been already enumerated that the NWP establishes the overall policy framework for the water sector and extensively cover the key areas of water resources management, urban water supply, and rural supply and sanitation management. Institutions and stakeholders under this sector operate at three functional levels. These are; at the policy level, organisational level and operational level.

Policy level: At the basic level or the policy level, three core ministries namely Ministry of Water Resources, Works and Housing (MWRWH), Ministry of Local Government and Rural Development (MLGRD), and Ministry of Finance and Economic Planning (MoFEP) and the development partners (DPs) collaborate on the service delivery of water and sanitation services. MWRWH plays the role of providing an overall sector policy guidance, and is also responsible for the provision of national level management and policy direction functions in the water resources sector (WRC, 2012, Dei, 2011).

According to the WRC (2012), the water sector was challenged by the absence of clear overarching strategy and a sector-wide coordination framework until recently. To solve this issue there was the need to provide policy direction at the national level, therefore, a Water Directorate (WD) was established in 2004 to most importantly give the water sector a voice, which had been lacking at central government level (WRC, 2012). Achievements of the WD so far, include, facilitation and the finalisation of the NWP in 2007 and is currently facilitating the development of a sector-wide funding arrangement (SWAP) which is a mechanism for support by government and development partners for

the water sector. The WD is as well coordinates the linkages with the other sectors and key Ministries, and Departments and Agencies (MDAs) such as the Ministry of Local Government and Rural Development (MLGRD). And most importantly, the WD solicit and coordinate funding from government and DPs, with the medium to long term plans of developing consolidated SWAP (WRC, 2012, 2010).

Under the current arrangement, the MoFEP is responsible for the economic and monetary policy of Ghana and is in charge of economic planning, national budget, fiscal policy, and creating the environment for investment and growth. MoFEP will be encouraged to take active interest in the establishment of a viable SWAP mechanism.

Organisational level: At the Organisational level of the Water Policy, three organisations perform different functions under the MWRWH as stated earlier. These distinct organisations are; GWCL in charge of Urban Water Supply), CWSA, (responsible for Rural Water Supply and related sanitation provision) and the WRC (for Water Resources Management). As already discussed, the GWCL is a quasi-governmental company responsible for overall planning, managing and implementing urban water supply projects (mandated by GWCL Act 461 of 1999) through the implementation of the National Community Water and Sanitation Programme (NCWSP) (WRC, 2012, MWRWH, 2007).

The Water Resources Commission (WRC) is responsible for the regulation and management of water resources and also acts as the body responsible for all water resource-related development and management matters in the country. It is an inter-agency Commission that acts as a focal point in promoting coordination and collaboration

among various stakeholders in the water sector. Stakeholders of the WRC are the following; Ghana Water Company Limited (GWCL), Hydrological Services Department (HSD), Volta River Authority (VRA), Water Research Institute of the Council for Scientific and Industrial Research (WRI/CSIR), Ghana Meteorological Agency (GMet), Environmental Protection Agency (EPA), Ghana Irrigation Development Authority (GIDA), Forestry Commission (FC), and Minerals Commission (MC), Women, NGOs and Traditional Authorities (Chiefs). The WRC performs its responsibilities through its River Basin Offices (RBBs), and collaborating and coordinating with District Assemblies and institutions represented on the Commission (WRC, 2012, 2010)

The National Development Planning Commission (NDPC) as the central economic planning authority in Ghana is in charge of the preparation of national development plans. It coordinates the development plans of all MMDAs in Ghana. NDPC provide the platform to integrating water sector development plans into the national development policy framework (Ghana Shared Growth and Development Agenda).

Operational level: At the Operational which is also primarily the decentralised administration level, institutions such as MMDAs, RBBs, NGOs/CBOs and other civil society groupings, working together within a river basin focused framework, are to take charge and coordinate water resource management and sanitation activities as far as possible with the idea of "management at lowest appropriate level" embedded in their management plans. MMDAs are responsible for planning and development in line with guidelines issued by the NDPC through the Local Government Service Commission (LGSC). The sub-district government structure (Area Council and Unit Committee)

establishes the avenues for local level participation in the planning and priority setting process. Specific to WSS, the MMDAs perform the following functions; i. to make district development plans that will cater for control of investments decisions of infrastructure development aimed at drinking water supply in terms of borehole provision and small dams and dugouts for irrigation. This will therefore demand coordination with CWSA and MOFA as agencies in charge, as well as the involvement of funding agencies, ii. Provide the necessary management support to the local communities in managing the infrastructure for domestic water supply and for irrigation systems. In the case of domestic water supply, the Water Supply and Sanitation Committee (WATSANs) and the Water Supply and Sanitation Development Board (WSDBs) have been established within the Assemblies to provide support to communities in the management of rural and small-town point-source supplies respectively.

As part of their functions, WATSANs process the applications of communities for boreholes, and also supervise the work of the consultants who are contracted to conduct community training. Water plays a very important role in agriculture especially in temperate zones which is why the national water policy makes provision for agricultural sector development through effective and efficient use of water in agriculture. Therefore with respect to water for agriculture, the administrative staffs at the District Offices of MOFA provide technical support through the implementation of projects and beyond. However, MMDAs are responsible for providing guidance for important aspects of the management of small reservoirs and also mediate in conflicts regarding land use related to small dams.

Non-Governmental Organisations (NGOs) in the water and sanitation sub-sector operate under *an umbrella organisation – Coalition of NGOs in Water and Sanitation (CONIWAS)* – with the aim of facilitating coordination and networking among NGOs and CBOs engaged in the sub-sector. The basic purpose of CONIWAS is to work in partnership with stakeholders to influence policies, remove barriers and promote access to potable water, sanitation and improved hygiene for the poor and vulnerable. It also mediates between members and statutory departments involved in the provision of water and sanitation services (WRC, 2012; MWRWH, 2007).

The WATSAN approach serves as part of decentralisation policy. It also forms part of the policy of implementing a demand-driven community-based rural drinking water supply, which stems from the principles of IWRM. Committees or sub-committees in charge of agriculture and domestic water supply at the MMDAs also serve as important platforms for discussing the demands of community members. Finally, data gathering and information for water resources management is vital in assessing water resources availability as well as quality and level of accessibility, therefore the role of the following institutions cannot be overlooked:

The Ghana Meteorological Authority (GMet) is responsible for meteorological services provision in the country. GMet, according to WRC (2012) has 22 synoptic stations, 132 climate sub-stations, out of which 116 are operational, and 300 rainfall stations. Hydrological Services Department (HSD) takes on the role of providing engineering services for the Government of Ghana in hydrology and water resources engineering.

This sector has been collecting data since the 1950s through 156 collection stations of different ages.

Water Research Institute (WRI) of Centre for Scientific and Industrial Research (CSIR) is one of the 13 institutions of the CSIR. It was established in 1996 from the merger of the erstwhile Institute of Aquatic Biology and the Water Resources Research Institute, which were established in 1965 and 1966 respectively, under the CSIR (WRC, 2012).

2.8 A critical look at the nature and status of access to water under the Customary and the Community Water and Sanitation Programme (CWSP)

This section delves into Customary and CWSP regimes through which water is managed basically because these two major regimes are what exist in the Ekumfi District which is primarily rural. The aim is to give a background to the line of questions asked in this thesis and the findings that were obtained from the field survey.

2.8.1 Customary regime of water resources management:

Water is treasured as a natural resource traditionally and sources of water under this regime are rivers, streams, wells and rivulets. It is noted that in most communities, there are no institutions charged with the responsibility to provide water which may be due to the fact that water for these communities are solely from natural sources. Abundance or scarcity of water depends on the time of the year. During rainy seasons water from traditional sources are in excess, and therefore, it can take people only about thirty minutes to get access to water (Mensah, 1999). In the dry seasons when less water is available, it is the duty of community members to search for water from scarce sources

from their communities or from other communities. This can take about two hours or more (Mensah, 1999).

Under the customary laws, access to ground water comes at a cost. There are instances were communities, in most cases, dig wells and use them as sources of water and a person is allowed to charge people who fetch some (Mensah, 1999).

Chiefs, elders and priest are in charge of water resources management under the customary system (Boyne, 2007). These authorities control, manage and dictate use of water resources and in most communities, rules governing the collection and use of water sources are 'commonsensical' (Mensah, 1999). Common among these rules are; the prohibition of the use of dirty bucket to fetch water; women are not to fetch water when they menstruate; there are specific days of the week, months or certain occasions when one cannot go into some water bodies, among other rules. These rules are normally backed by traditional religious beliefs and are also attempts to control pollution and water quality within the limit of traditional knowledge. Sanctions for disobedience include sacrifice of sheep, provision of schnapps or payment of some amount of money (fines) to the elders of the community (Odame-Ababio, 2002; Mensah, 1999). However, enforcement of traditional or customary law is dependent on the cultural orientation of the locality.

Mensah (1999) argues that the quality of water under customary sources of water poses serious health implications to people because water from this source is usually contaminated with water borne diseases. Modes of storing water usually include barrels, buckets and open pans and in situations where water is not covered properly, flies can

contaminate it, giving rise to cholera among other diseases. In his quest to probe into user's perception or views of the customary regime, Mensah (1999) discovered that most communities were aware of the inadequacies of the traditional sources of water and wished to be part of the CWSP. He argued that the general concerns of these communities were about the quality (taste, smell and content) of the water available to them. Most of the communities he conducted his study in were aware that traditional sources of water bring diseases. Other issue of concern to them was the long distances they have to walk and the time spent just to get access to water. Children spend long hours in the morning collecting water and as a result would have to miss school. Another very important issue raised was that, the short supply nature of water all year round in this regime, affect general cleanliness and the social life of communities. Also, trained personnel such as teachers usually refuse transfers and postings to these areas that lack potable water.

Mensah (1999) further assesses the traditional regime by asking whether the customary regime solves the poverty problem in rural communities. There was the consensus that this regime tries to solve the poverty problem, however, the customary regime largely contributes to poverty. This is due to the fact that water from this regime may not be available all year round and is also substantively a source of many diseases (Mensah, 1999).

Human settlements are located away from water sources under the traditional or customary system of water resources management as a means to control pollution. This is to prevent the dumping of household waste into water bodies. And as already indicated,

there are taboo days among other rules or laws which are meant to protect fish stock among other things which are all within the limits of traditional knowledge aimed at pollution control and water resources management as a whole. It has been argued that these methods are generally ineffective. As populations have increased over the years, human settlements are now close to water bodies (MWRWH, 2007).

There has also been the issue of poor land use which has destroyed the environment in many ways. Mining and other industrial activities have destroyed many water bodies in the country. Unfortunately, as people become more and more educated and less homogeneous, taboos and religious sanctions that are meant to be as punishments for disobedience under the customary system are ignored (Odame-Ababio, 2002; Mensah, 1999). In addition, water conservation has somewhat been unnecessary because of the low level of technology required in the traditional wells are not deep enough to cause any depletion to the water table. The natural water cycle is also able to regulate the amount of available water.

With respect to gender issues in water resources management, Mensah (1999), states that at a glance, customary law can be argued to be *anti-female*. He adds that customary rules restrict women in their ability to get water but however argues that a critical look at the issues suggest that customary laws and regulations refer to women because they are the primary collectors of water. For example, the rule that women are not allowed to fetch water when they are menstruating is meant to protect water quality. It is a fact that customary law is not anti-female, one may argue, but it is not pro-female either. This is because, though women play a very important role in collecting water, the customary

system does not give them any important role in water resources management. These rules do not cover any means to relieve women of their pain in collecting water with such issues ranging from walking long hours to collect water especially in the dry seasons and having to collect a lot of water to cater for her whole family (Mensah, 1999).

In conclusion, customary system of water resources management has its strength especially because the entitlement under customary law is strong and can alleviate poverty if grafted into the CWSP. However, customary system alone is inadequate in providing water to rural areas in Ghana in that it is unable to provide water all year round and is also a source of many diseases among others. Its conservation and pollution control measures are woefully inadequate and it does not give any significant relevance to the role of women in water resources management (Mensah, 1999).

2.8.2 The Community Water and Sanitation Programme (CWSP)

Among the objectives of the CWSP is to assist communities to gain access to water. it is also to ensure that there is a minimum basic service of water that is protected all year round, of 20 liters per day, within 500 meters for consumers living close to a water point. According to CWSP Implementation Manual, 1996 p1 (cited in Mensah, 1999), a water point must not serve more than 300 persons. In this system, women are not left out as they are given a central role in the design and management of water facilities. Private sector participation is also encouraged by being given the responsibility to design, construct, and maintain facilities. NGOs are not left out as they are given the opportunity to provide training in the management and repair of water facilities. Local government

authorities provide infrastructure and are responsible for encouraging an integration of other water related sectors in water resources management.

The institutional make-up of the CWSP is as follows; every village or community under the programme must form a water and sanitation committee known as the WATSAN committee which is responsible for all operations in relation to the control and maintenance of water and sanitation facilities. It is also to be responsible for hygiene and environmental education and also for revenue collection (Dei, 2011).

At the district level, the District Water and Sanitation Team (DWST) which is part of the local government system provide assistance in the provision of water and sanitation. DWST members are residents of the district and have skills in hygiene education and water and sanitation related issues. The District Assembly is in charge of supervising the DWST to ensure that they fulfil the requirement of the WATSAN. The District Assembly maintains a dialogue with the CWSA (Community Water and Sanitation Agency) and other related sectors that deal with the provision of water at the district level (Odame-Ababio, 2002).

At the regional level, the Regional Water and Sanitation Team (RWST) are responsible for implementing the CWSP in the region. Most importantly the RWST is to assist District Assemblies to form and train the DWST. It is the responsibility of the RWST to determine the specific character of the water and sanitation programme in a particular region. They decide the districts and communities that would benefit from the programme in any particular year (Odame-Ababio, 2002).

At the national level, the CWSA has a national office in Accra. It draws out recommendations to the government about policies for rural water and sanitation in Ghana.

Communities benefit from the CWSP by filling forms and submitting it to the DWST. The DWST then follows up by visiting the community to assess the community's interest in the programme. A sub-committee of the District Assembly then reviews the community's application and then will forward the request to the RWST for approval. Upon approval by the RWST, an animation team will then be sent to the community to train the community on the management of the water facility. The community must then raise their share of the funds required to establish the facility. If for some reasons the community is unable to mobilise the funds, the programme is suspended until this is done.

However if the funds are available, the animation team and the community, produce a 'Facilities and Management Plan' draws out the design of the water and sanitation facility and a financial plan for the project. The plan usually also covers hygiene education. Both the DWST and the RWST must approve the plan. If the RWST gives its approval, contractors then build the water facility. After completion facility is then handed over to the community, but the contractor then would have to provide twelve months warranty (Mensah, 1999).

Mensah (1999), again in assessing access to water under the CWSP observed that boreholes and hand dug wells serve as 95% sources of water to most communities under the CWSP. The remaining 5% use the traditional wells and the traditional sources of

water. The WATSAN committee pays for the water provided and therefore decides the amount communities would have to pay per bucket. Charges range between 10 to 30 pesewas per bucket (Mensah, 1999). However, some community members (usually a minority) complained about the payment they have to make for water. It has been argued that this is mainly due to the culture of dependence that accrued because the government provided everything in the past. Some communities use some of the monies gained to embark on other developmental activities. Generally, communities under this programme are satisfied with the quality and the quantity of water gained from usually boreholes and dug wells. According to his study, no community has complained about long interruption in their supply of water under the programme. This can however be largely contested. He asserts that interruptions are usually due to break down of parts of facilities. Under this programme, women generally spend less than 15 minutes to fetch water (Mensah, 1999).

One of the challenges of this programme is the storage of water by community members (Mensah, 1999), in that water is stored in barrels, buckets and open tanks which frequently get contaminated. Whiles this programme has led to a reduction in guinea warm infection, cholera and typhoid still remains a problem.

A major weakness that has often been reported with respect to CWSP is the weak institutional capacity of local governments (Acheampong, 2011; Essaw, 2007; Odame-Ababio, 2002; Mensah, 1999). Researches have argued that, local governments have not shown any significant level of commitment to the programme. Progress in the CWSP has been hampered by the slow pace in the creation of DWSTs in many districts.

Secondly, due to the fact that there is no mechanism for providing water at reduced tariffs to poor communities in that unless a community is willing to pay, it does not become part of the programme. Communities who are unable to afford have to rely on other sources of water which are usually unhealthy (Mensah, 1999). On the positive side, the CWSP has greatly reduced disease like guinea warm infection and the provision of clean water has also improved personal cleanliness and socio-economic lives of most communities. Most importantly, trained personnel such as teachers are now more willing to accept postings to these rural areas. There has also been evidence of improvement in school attendance by children in communities that have benefitted from the programme in that they no longer have to walk for hours in search of water (Odame-Ababio, 2002).

Interestingly, environmental protection and water conservation still remain major problems in rural communities. Communities usually make their own rules and regulations to govern water facilities. Examples include, not washing near water point and one cannot use dirty items to fetch water. However, it is a well-known fact that water conservation and environmental protection are far too complex for rural communities to handle (Mensah, 1999). District assemblies are severely constrained in terms of capacity to protect and conserve water resources at the local level.

The CWSP has however made a significant improvement in recognizing the role of women in water resources management. Women are now given the opportunities to design and manage water facilities in most communities under the programme (Odame-Ababio, 2002).

CHAPTER THREE

THEORETICAL, CONCEPTUAL AND METHODOLOGICAL ISSUES

3.0 Introduction

This chapter delves into the theoretical and conceptual backgrounds that are relevant to this research. This chapter also provides brief background information of the study area. Then, finally, this chapter presents a detailed description of research strategy and design that were adopted for the data collection of this study as well as the various analytical tools that were used to analyse the findings from the field survey.

3.1 Theoretical background of the study:

Water resources management in Ghana both at the local and national level now aims at the type of management that shift from the usual centralised nature to one that incorporate multi-sectoral cooperation and most importantly, community participation (Essaw, 2007; Mensah, 1999). It has been recognised that the management of water resources is a multi-faceted affair which involves various number of users and institutions. Mensah (1999) acknowledged that until recently, different users and institutions of water sector pursued their mandates and plans with little or no coordination among themselves.

However, this old system has now given way to paradigm shift in that there have been genuine attempts to integrate policies and strategies to facilitate the provision of water and water management as a whole in a multi-faceted manner (Mensah, 1999). These ideas which have been boosted by the recent adaptation of integrated approaches to water resources management have informed drastic changes in water resources management in

Ghana. The theoretical underpinning of this research therefore stems from Habermas's (1984) Theory of Communicative Action/Rationality which has been recognised by Saravanan et al., (2009) as the core of water resources management that is done in an integrated manner.

Habermas (1984) defines communication action or rationality as the interaction of social actors pursuing goals by achieving shared understanding and coordinating their plans of action. According to him *"communicative action denotes interaction of social actions oriented to reaching understanding, in which they relate simultaneously to the objective, social and subjective world. They come to understanding with one other by negotiating definitions of situation, argumentation and cooperative interpretation of events, goals, values and norms, and by sharing their subjective experiences, desires and feelings* (Habermas, 1984; 2).

Habermas provides a theoretical background of a view of water resources management that emphasises wide spread participation, information sharing with the public, changing of institutional structure to facilitate open governance among actors through a medium of the establishment of laws etc. (Cecez-Kecmanonic and Janson, 1999). Bolton (2005; 2), advocates that this theory provides a theoretical basis for the type of management that avoids *"privileging of experts and bureaucrats, and replacing a model of technical experts with one of relative planner"*.

This theory is contrary to Hardin's (1968) (cited in Boyne, 2007) "Tragedy of the Commons" theory which argues that users of common property cannot be left to decide how to use them and that their use has to be controlled to avoid exploitation.

Habermasian communicative action theory unlike Hardin's tragedy of the commons advocates for a bottom-up other than top-down approach to natural resources management.

To Saravanan et al., (2009; 77), this theory of communicative action emphasises changing existing institutional structures to one that accommodate an 'open discursive style of government among actors'. Habermas recognises the importance of institutional reforms to facilitate communicative actions. This approach also rejects the individual basis of society and accepts the community-based approach to water resources management. This is upon the belief that all sections of the society can be identified easily that they are equipped with equal knowledge and can be included for communicative action (Saravanan et al., 2009). This process of decision making that seeks widespread agreement among group members is the essential tool in water resources management in that stakeholders are involved in the planning and decision processes.

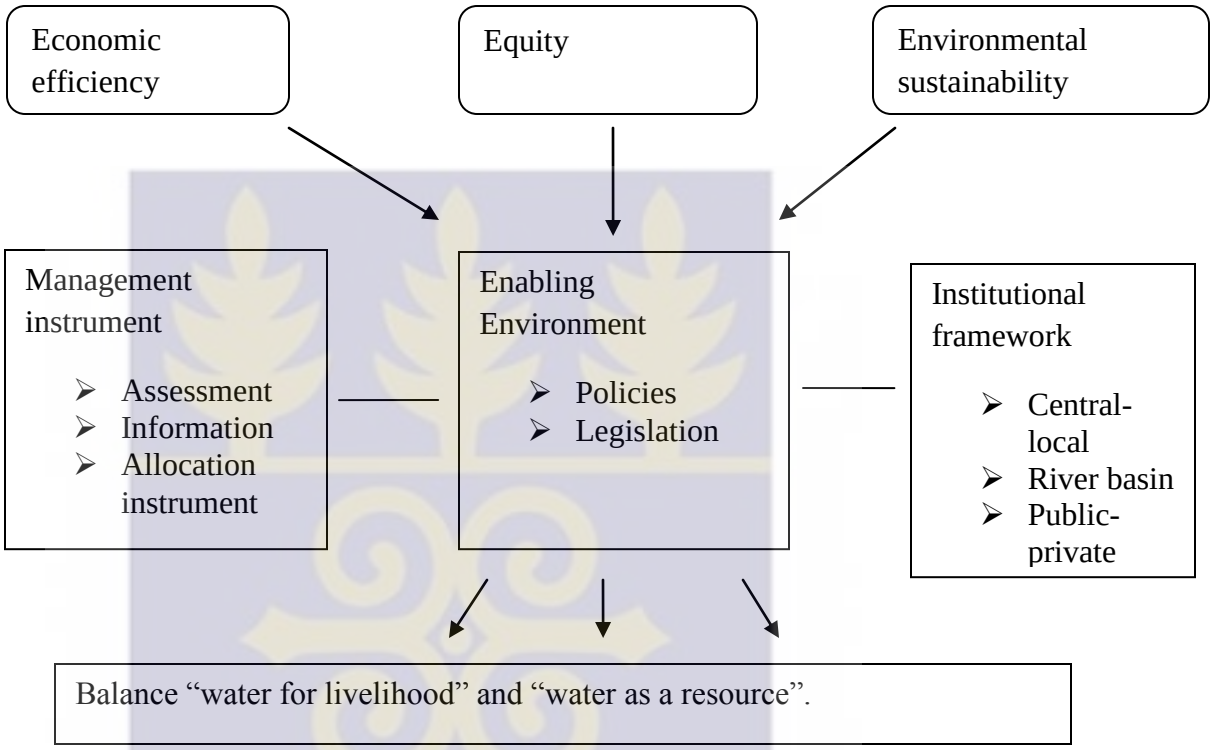
Saravanan et al., (2009) further included that for Habermas, the central element for the promotion of communicative action depend on constitutional, institutional and legal development acquired through laws. Such laws emphasize a range of management instruments that are necessary in decision making among stake holders in the water sector. These arguments therefore reinforce the researcher's decision to use the Theory of Communicative Action as the theoretical underpinning of this research. It also provides the basis for the choice of conceptual framework for this research.

3.2 Conceptual framework for the study:

From the review of literature on water resources management both on the world level and in Ghana, this study has adopted figure 3.2 as the conceptual framework for the analysis of water resources management at the local level in Ghana. Since water resources management in Ghana both at the national and local level, draws inspiration from integrated approaches to water resources management, this research adapts Jonch-Clausen's (2004) concept on water resources management.

Sustainable water resources management is about managing the delicate balance between water for livelihood and water as a resource and this largely depends on getting the "three pillars" right (Jonch-Clausen, 2004). According to Jonch-Clausen (2004) in his paper written for the GWP Technical Committee entitled 'Integrated Water Resources Management and Water Efficiency Plans by 2005' Why, What and How?', successful implementation of the current paradigm on water resources management on the ground' process is in fact a question of getting the three pillars right: moving an *enabling environment* of appropriate policies, strategies and legislation for sustainable water resource development and management; putting in place the *institutional framework* through which policies and strategies can be implemented and setting up the *management instrument* required by these institutions to do their job' as illustrated in figure 3.1 below (Jonch-Clausen, 2004).

Fig 3.1: Jonch-Clausen's model of integrated approaches to water resources management



Source: Jonch-Clausen, 2004

A. The enabling environment

Policies: The GWP acknowledges policy setting for water use, protection and conservation. This part of the framework is concerned with water policies and their development. This entails developing national objectives for the management of water resources and water service delivery within a framework of overall development goals.

Participation of community members is seen as an essential ingredient in water resources management process. The UN 1997 cited in Poolman 2005, considers participation as an "essential component of successful and lasting development". In that participation stimulate equity by providing opportunity for people living in poverty and other groups in

planning implementation. Through the process of participation, the gathering and dissemination of information concerning that which is to be developed can easily to undertaken (Poolman, 2005).

Legislative: this constitutes the rules to follow to achieve policies and goals. The legislative framework that is expected to facilitate water resources management should cover water laws which must cover ownership of water, permits to use (or pollute) it, the transferability of these permits, and customary entitlements. It supports regulatory norms such as conservation, protection and priorities.

Financing and incentive structures forms an integral part of this section in that the financial needs of the water sector are huge and water projects are usually capital intensive. Allocation financial resources are required to meet water needs

B. Institutional framework

This entails creating an organisational framework (forms and functions) which must aim at the development of institutional reforms for better governance. Jonch-Clausen, 2004 states that ‘’the practitioner needs to create the required organisations and institutions, from trans boundary to basin level, and from regulatory bodies to local authorities, civil society organisations and partnerships.

Institutional capacity building: institutional capacity building in reference to human resource development is recognised in most policy initiatives. This covers skills upgrade, understanding of decision makers, water managers and professionals in all sectors as well as capacity building for regulatory bodies and for the empowerment of civil society groups.

C. Management instruments

Management instruments enable stakeholders to make rational and informed choices between alternative actions, (Saravanan et al, 2009). Water resources assessments incorporate undertaking resources assessment, starting with the collection of hydrological, physiographic, demographic and socio-economic data assembly and reporting.

Regulatory instrument: contextualization of regulation in the sense covers water quantity, service provision, land use and water resource protection. The key to implementing plans and policies hinges on regulations and can fruitfully be combined with economic instruments.

Economic instruments in this context entail using value and prices for efficiency and equity. With respect to equity, Saravanan et al (2009), stated that "*complementarities between conservation and productivity objectives makes integration in water resources management especially attractive in developing nations; the logic being that Integrated Approaches to Water Resources Management can address equity in the developing world by focusing programmes on the weaker sections of the society- the poor, the landless and the women*".

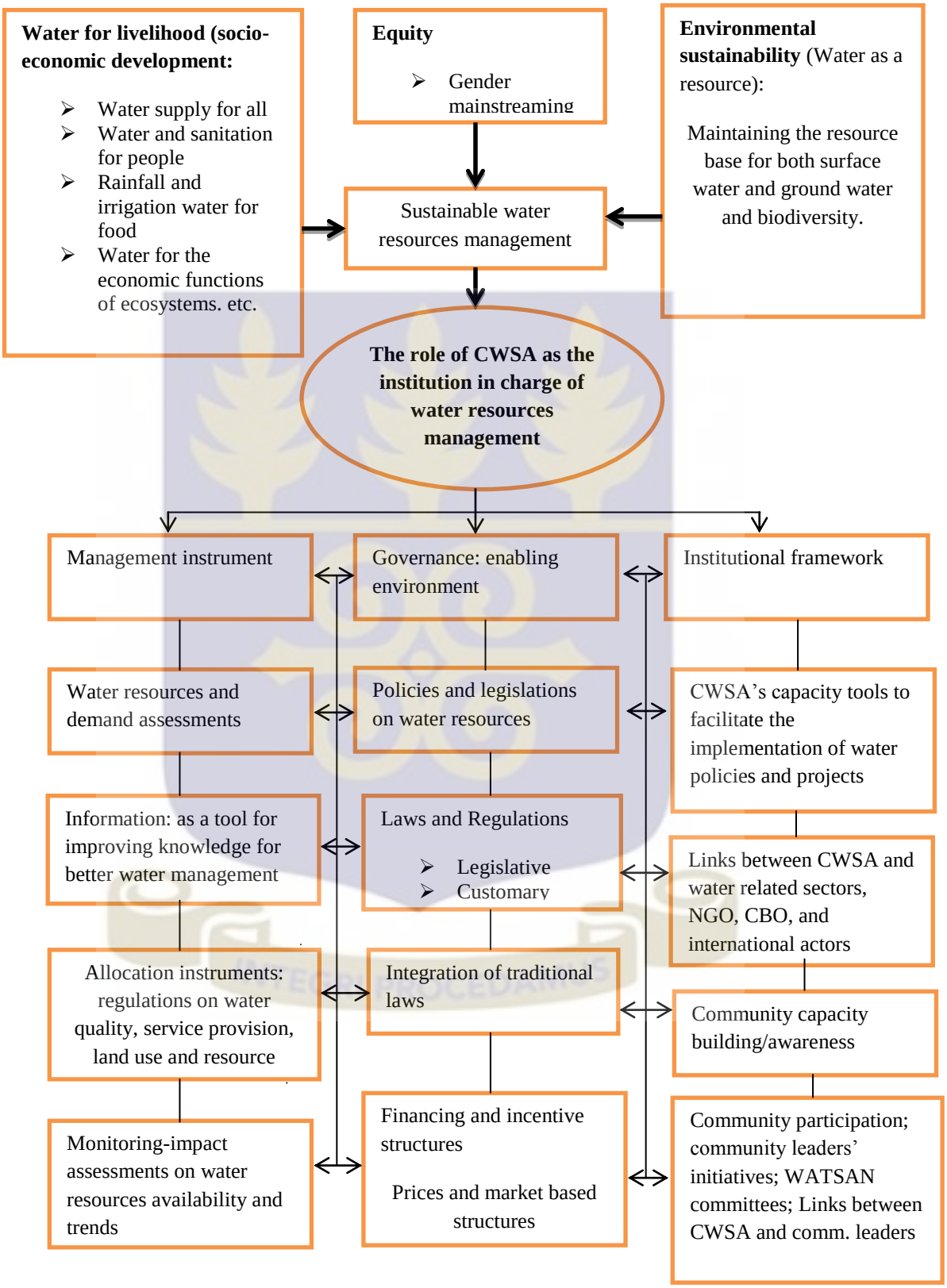
Economic instruments or tools involve the use of prices and other market-based measures to provide incentives to all water users to use water "carefully, efficiently and avoid pollution".

Information management and exchange: Jonch-Clausen (2004), explains that 'improving knowledge for better water management will involve sharing methods and technologies

which will in turn increase stakeholder access to information stored in public domain data banks and effectively complement more traditional methods of public information'.

Also, the role of funding is indispensable in the sustainability of water resources management. Integrating institutional structures in water resources management becomes "highly questionable when financing is limited" (Saravanan et al, 2009). Mensah (1999; 21) recognises that the major enabling condition for the success of the CWSP in some part of Ghana has been the general consensus among stakeholders that "increasing the supply of water and sanitation to the poor is essential if there is to be an improvement in the standard of living of Ghanaians. He added that, as at the time of his study of "water laws, water rights and water supply" in 1999, effective policies and strategies were in the process of being developed to implement the plans and programme of providing water and sanitation to many Ghanaians. He also asserted that there was a constant collaboration between donors, the government and NGOs to review progress in the implementation of the CWSP. Community participation in the provision of water and sanitation, he added, has greatly improved the sustainability of water supply programmes (Mensah, 1999). Considering the various arguments raised, this study has adapted figure 3.2 as the conceptual framework for analysing water resources management in Ghana.

Fig 3.2: Conceptual framework for the study



Source: Adapted from Jonch-Clausen, 2004.

From the framework above, any water resources policies, plans or actions aimed at sustainability should be one that balances water for livelihood and water for environmental sustainability whiles at the same time promoting gender and social equity. This can only be done by keeping the three pillars (institutional framework, enabling environment and management instrument) straight. For this thesis, institutional framework covers the capacity of CWSA to facilitate the implementation of water plans and projects in the ground. This also looks at the level of coordination and cooperation between the CWSA and NGOs, CBOs as well as international partners.

Putting in place institutional frameworks also covers most importantly, community capacity building or awareness as well as community participation especially the involvement of community leaders and establishing active links between the CWSA and WATSAN committees.

Enabling environment captures policies and legislations on water resources management by looking at existing laws and regulations which basically cover both legislative and customary laws on water resources management. This also pays homage to the integration of traditional laws in the management of water resources management by the CWSA. Financing incentive structures which encompasses prices and market based structures is also an essential component of this as far as this research is concerned.

Lastly, establishing management instrument demands, water resources and demand assessment; making available information as a tool for improving knowledge; establishing regulations on water quality, service provision, land use and resources; and conducting impact assessments on water resources availability and trend (Jonch-Clausen, 2004)

3.3 Profile of study area:

3.3.1The Ekumfi District:

Ekumfi District with its capital **Essarkyir** was carved from Mfantseman and forms part of the new districts and municipalities created in the year 2012 and were inaugurated at their various locations simultaneously on the 28th June, 2012. The Assembly has 8 sub-district structures made up of 1 Town Council and 7 Area councils. The sub districts are: Otuam Town Council, Narkwa Area Council, Eyisam, Essarkyir, Ekrawfo, Ebiram, Assafa and Immuna.

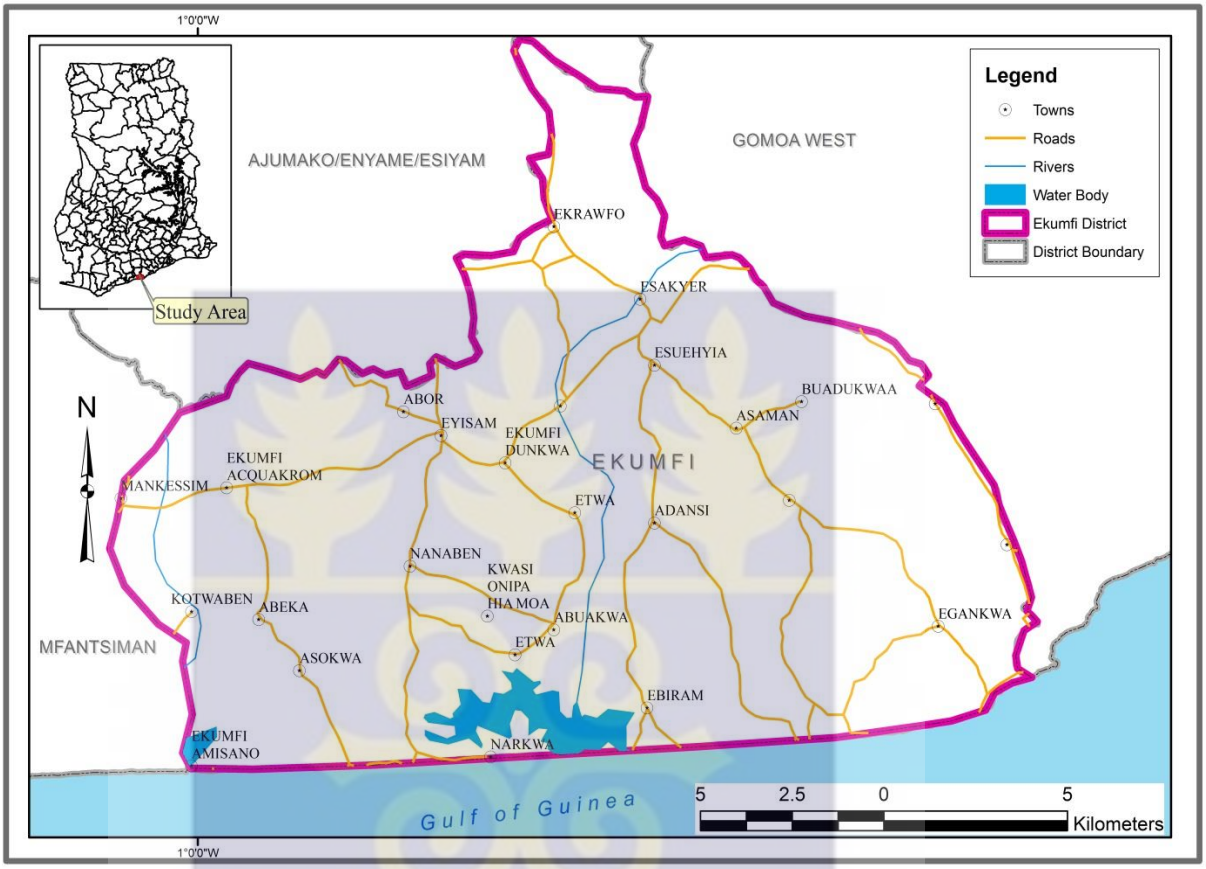
The Ekumfi district is located along the Atlantic coastline of the Central Region of Ghana and extends from latitudes 0.916451oW, 5.367043oN and longitudes 0.925398oW, 5.424463oN. The district is bounded to the West by Mfantseman, to the North by Ajumako-Enyan-Essiam District and, to the East by Gomoa West District and to the South by the Gulf of Guinea.

3.3.2 Relief, Geology and Drainage:

The Ekumfi District is basically a low-lying area with loose quaternary sands.

The area has an elevation lower than 60m above sea level. Along the coasts are cretaceous—Eocene marine sands with thin pebbly sands and some limestone. The District consists of upper and lower Birimian rocks and intrusive Tarkwaian rocks. These rocks have metallogenetic materials (metals), which include Precious metals, Light metals and Base metals such as talc and diamonds. The Ekumfi District is drained by a number of rivers and streams including the Narkwa and Amisa (Ochi). The rivers Narkwa and Amisa drain into the sea via the Narkwa and Amisa lagoons at Narkwa and Amisano respectively.

Figure 3.3 Map of the Ekumfi District



Source: Obtained from the GIS Lab of the Department of Geography and Resource Development, University of Ghana (2014).

3.3.3 Climate:

The Ekumfi District with its proximity to the Atlantic Ocean has mild temperatures, which range between 24^{o} C and 28^{0}C. It has a relative humidity of about 70 per cent.

The district experiences double maxima rainfall with peaks in May to June and October. Annual totals of rainfall range between 90 cm and 110 cm in the Coastal Savanna areas and between 110 cm and 160 cm in the interior close to the margin of the forest zone.

The periods December to February and July to early September are much drier than the rest of the year.

3.3.4 Vegetation:

The vegetation in this area consists of dense scrub tangle and grass, which grow to an average height of 4.5 m. It is believed that the District was once forested, but has been systematically destroyed through centuries of bad environmental practices such as bush fires and deforestation among others. However, pockets of relatively dense forest can be found around fetish groves and isolated areas.

These physical characteristics have combined effectively to offer opportunities in agriculture (farming and fishing) to the people. The proximity to the sea has made fishing a major activity along the coastal towns and villages notable among which are Otuam and Narkwa.

Further, the effective interactions among climate, soils and rivers/streams have made farming possible especially in the inland areas. Among the crops cultivated are oil palm, pineapples, oranges, plantain, cocoyam and coconut.

3.3.5 Population:

The district has a projected total population of 65,775 made up of 32,230 males and 33, 545 females. The annual population growth rate of the district is 2.8%.There are 57 communities in the district with Otuam being the most denselypopulated.

3.3.6 Economic activities:

Farming and fishing constitute the main economic activities of the District, employing about three-quarters of the total workforce (source: “Ghana: We Mean Business. A Guide

to Ghana's 110 Districts" , cited by DESSAP, 2009). Farming is done in almost all parts of the district, especially in the inland areas and crops cultivated include, oil palm, cashew, oranges, plantain, maize, cassava and pineapple production (which is the main farming activity in the district). Fishing is done mainly along the coast in settlements such as Otuam and Narkwa.

Trading, as an important economic activity is carried out in small scale in every area in the District. However Mankessim in the Mfantseman District serves as a major focal point. Goods include food crops, fishing and other merchandise. Nonetheless there are a few significant trading centres in the Ekumfi district which include Essuehyia, Narkwa and Otuam.

3.4 Research methods

This section captures the methodological processes that guided data collection, codification and analysis of field data gathered for this study. This encompasses research strategy and design processes, methods of data collection, sampling procedure, sampling size, methods and data analysis.

3.4.1 Study area:

As stated earlier, the Study area was The Ekumfi District of the Central Region of Ghana.

3.4.2 Research strategy:

Research strategy is the broad orientation to social enquiries or research with the distinction between quantitative and qualitative strategies. The researcher employed the use of Mixed Method Approach (also known as method triangulation) which is the

combination of elements of qualitative and quantitative research approaches, to collect and analyze data for this study. This is because the use of qualitative and quantitative data can cross validate each other around a common reference (Teye, 2012). Johnson and Onwuegbuzie (2004), (cited in Teye, 2012) summarize five main purposes for combining qualitative and quantitative techniques in a single research. According to them, Mixed methods are used for the purpose of:

- Seeking convergence and corroboration of results from different methods.
- Initiation- discovering contractions can lead to a formulation of the research problem
- Development of methods- triangulating two methods can help improve each other.
- Expansion- using different methods to investigate different components of the research problem expands the breadth of the research.

Mixed methods provides a broader opportunity to better understand research problems and therefore provides a more favorable chance for formulating policies for dealing with the social problems (Teye, 2012). Using mixed methods helped the researcher to understand the problem better.

3.4.3 Research design:

The study adopted the cross sectional survey design. Cross sectional design involves the collection of data on more than one case and at the single point in time. Cross sectional research design is good for determining variation, patterns of associations and may also indicate causation by examining relationships between variables. In lights of the above, cross sectional is the best choice for the study since the researcher aims to look at the

collection of data on water resources management in more than one community by comparing variables to determine variations and patterns of associations.

3.4.4 Data sources:

There were two major sources used in the gathering of data for the study. These were primary and secondary sources. Selection of a particular source for data collection is dependent on one's problem, the purpose of the study, the resources available and the skills of the researcher (Boyne, 2007). The socio-economic demographic background or characteristics of the study area also play an important role in the choice of data collection approach. The researcher must therefore bear in mind the type of people of the study area, the nature of the social situation and the mood of the social environment (Boyne, 2007). In light of these, it is best to use more than one source in data collection. As a result, data was collected from both primary sources through questionnaires, interviews, focus group discussion and observation, whiles secondary data was obtained through journals, books, electronic material etc. the details are as follows:

3.4.5 Primary data:

Data was collected using questionnaires, interviews and focus group discussions and observations.

Questionnaires: A questionnaire is a list of questions given to informants to answer with the aim of soliciting information relevant to a particular survey. The questionnaire approach was adopted in this study to seek information from community members. This

involved both closed and open ended questions. Some of the questionnaires were self-administered whiles majority of the questionnaires were interviewer-administered as a result of the low rate of literacy in the communities.

Interviews: In-depth interviews were used to solicit information from central and local administrative heads. An interview is a form of conversation in which one person- the researcher or interviewer- restrict oneself to posing questions concerning behaviours, ideas, attitudes, and experiences with regard to social phenomena, to one or more others- the participants or interviewee- who mainly limit themselves to providing answers to these questions (Maso, 1987, cited in Boeije 2010). Interviews provide an opportunity for researchers to learn about social life through the perspective, experience and language of those living it. Participants are given the opportunity to share their story, pass on their knowledge, and provide their own perspective on a range of topic (Boeije, 2010).

Interviewing central and local administrative heads as well as traditional leaders in the study area on water resources management practice provided the researcher with true understanding of what is happening on the ground.

Focus group discussions: focus group discussions which involved various water users were also adopted for this study. Focus group discussions according to Boeije (2010), are qualitative interviews with more participants at a time. Focus groups represent a specific set of group interviews that particularly emphasize the interactive patterns among group members and how they come to generate mutual understanding. A focus group is a group interview – centred on a specific topic ('focus') and facilitated and co-ordinated by a moderator or facilitator- which seeks to generate primarily qualitative data, by

capitalizing on the interaction that occurs within the group setting (Sim, 1983, cited in Boeije, 2010). The primary aim of using focus group discussions in the study was to find out what was expressed as water resources management in a group context. Focus group discussions are mainly to stimulate how a group progresses when brought together, stemming from the assumption that people in general do not develop their opinions and views in vacuum but operate in groups all the time (Boeije, 2010). Focus group discussions for the study involved community leaders as well as ordinary men and women of the communities.

Observations: karma (1999) (cited in Boyne 2007) defines observation as "*a purposeful, systematic and selective way of watching and listening to an interaction or phenomena as it takes place without asking the respondent"*. The basic aim was to obtain accurate information either to confirm information obtained from respondents or to gain new information about the topic at hand. This approach involved obtaining relevant data during preliminary visits to gain first-hand information on how water resources are managed.

3.4.6 Secondary data:

Data was collected using journals, books, electronic materials, archive data etc. Information was also obtained from government agencies such as the Mfantseman Municipal Assembly. Boyne (2007) argued that, using secondary data gives a researcher an upper hand in that the researcher can evaluate information prior to use other than a researcher who only relies on primary data. He added that reviewing earlier work done gives the researcher the required information on the subject matter. Secondary data serves

as a guide throughout the whole research process in that it provides the researcher with what other researchers have discovered concerning the topic at hand.

3.4.7 Targeted population:

The targeted population involved various stakeholders of water: These included

- Management at the Community Water and Sanitation Agency specifically, the District Community Water and Sanitation Team
- Local government,
- WATSAN Committee members
- Assembly men
- Traditional heads
- Water users in general.

3.4.8 Sampling technique:

The study employed the use of multi- stage sampling. Multi-stage sampling involves the selection of a sample by grouping units into a number of smaller units from which a number of groups are selected.

Stage 1: Stratified sampling of community based on population size.

Stratified samples are representative, problematic and random. This stage involved, first by dividing a sample frame into sub groups or strata. Basis of stratification was population so communities in the study area were divided into two groups; 1. Communities with population above 5000 and 2.Communities with population below 5000. According to the Ghana statistical service (2013), communities with a population of 5000 and above is considered an urban community. So the basic

purpose of this stratification was to group the communities in the study area into urban and rural for the purpose of spatial differentiation. It is important to note that even though the two communities sampled had populations of 5000 and above and are urban areas according to the Ghana Statistical Service, these communities are under the jurisdiction of the CWSA in the Ekumfi District.

Stage 2: two communities were sampled from urban and four from the rural category. However it is important to note that, this sampling was also based on the distances community members are from different water sources. At this stage, communities were randomly sampled from each strata. Two communities which fall in urban category and four communities which fall in rural category were sampled. Simple random sampling gives each unit of the target population a known and equal probability of selection.

Stage 3: Systematic sampling was then employed to sample houses

Stage 4: Simple random but purposive sampling was used to interview household water collectors. Purposive because household heads and women were the target of this stage based on their knowledge on the subject matter. so even though women were targeted, in situations where there are more than one woman in a household, or where there are more households in one house, the respondent will be randomly selected.

Purposive sampling was used in selecting stakeholders at the central and local administrative heads based on their knowledge of the study. Purposive, also known as judgmental sampling is a procedure where by the researcher selects sample elements on the basis of judgments derived from prior experience.

3.4.9 Calculation of sample size

In calculating the sample size for the study, the researcher adopted Cochran's (1977), formula for sample size calculation. Refer to appendix (six) for further details.

3.4.10 Stages of data collection

The study was conducted in two stages: the reconnaissance survey and the main survey. With the main survey, qualitative and quantitative data were collected concurrently. Data was collected on the management of water resources by government institutions and community members of the district.

The study started with a reconnaissance survey with initial visits to familiarise, build linkages and establish relationships with the communities. The first point of contact for the researcher was the Ekumfi District Assembly where the researcher met with the District Chief Executive, the Planning Officer and the Leader or Focal Person of the DWST.

In each of the communities, the researchers first visited the chief or the assembly representative in situations where the chief was not around during the time of visit. Announcements were made through public address systems to inform community members of the study to enhance cooperation on the part of community members. This phase also took time to observe areas of interest such as the various sources of water available to community members.

During the second stage which is the main survey stage, the focus was to solicit information on how water resource was managed by using primary data collection instruments such as questionnaires, interviews and focus group discussions. This required

analysis, an inquiry into the capacity of the CWSA, their level of coordination with other water related sectors, level of community participation as well as the laws and regulations put in place to protect and conserve water sources in the various communities. Interviews, focus group discussions and questionnaire /administration were all done concurrently. This whole process spun from March to April 2014.

3.4.11 Primary data analysis

By way of analysis the study employed both qualitative (descriptive), quantitative (SPSS) and comparative analysis approaches to assess key issues that concerned the study. Qualitative data is made up of words or observations as opposed to numbers (Stucki, 2011). Part of the data gathered for this study was qualitative and therefore qualitative data analysis was a key method in drawing out new findings. Stucki (2011; 21) defines qualitative data analysis as "*a range of processes and procedure whereby qualitative data that have been collected are processed into some form of explanation, understanding or interpretation of the situation under investigation*". She added that the steps normally involve writing, coding, interpreting and organizing data either manually or by using a computer based method. Qualitative data were obtained through the medium of observations, interviews and focus group discussions were manually coded, interpreted and analysed after the day's work. It was mainly done by coding data into themes as frequently used and linkages between the themes were manually transcribed and analysed. This was purposely to trace important view points and issues that were raised during the day so as to prepare adequately for the next day. Most importantly, it was also to look out for consistencies and inconsistencies in the information given and to bridge differences in views and observations.

In the analysis of the quantitative data, field data from questionnaires were tabulated and processed using SPSS version 20. The statistical methodologies used in the analysis, interpretations and presentations are: frequency distribution tables, multiple response analysis, cross tabulation and some basic graphs adduced using The Statistical Package for the Social Sciences (S.P.S.S.) version 20 as stated earlier. This was done by pre-coding questionnaires by assigning numbers to pre-determined responses in order to avoid descriptive responses. Variables of key issues from the questions were then created. The codes were then entered into a readily prepared SPSS template in accordance with the variables created.

Comparative analysis was also conducted which involved comparing and contrasting two things, issues, phenomena etc. in order to trace similarities as well as differences between the two based on the findings on the topic in question (Stucki, 2011). In comparative analysis, the frame of reference serves as the reference guide in which things to be compared are placed. In this thesis, the conceptual framework (fig 3.2) for the study as presented in chapter three is the frame of reference. As part of this study, water resources management (comprising access to water and water resources management as a whole) in urban and rural settings were compared with each other and mirrored against internal water resources management policy processes. The basic aim was to enhance understanding of disparities in water supply, access to water and the management of water resources as a whole in the Ekumfi district by comparing various cases rather than studying them separately.

3.5 Analytical representation of the empirical data

This section breaks down specific tasks which were designed under each objective to help achieve the overall aim and these tasks were highly coherent between each other.

Table 3.1: Analytical framework of the empirical data

Objective 1: To assess the institutional capacity of the Community Water and Sanitation Agency in the supply of safe and reliable water and the management of water resources in the study area.		
Task 1: Assess disparities in water supply/ access to water between rural and urban areas **Indicators** • Sources of drinking water in the communities • Quality of drinking water • Location of water sources • Rate of availability of water from these sources • Cost of water a day per household • Adequacy of water • Time spent on collection of water • Improvement or deterioration in access to water within the last ten to five years **Task 1b:** To assess access to water as far as the districts is concerned and the role of the CWSA in this issue **Focus:**	Participants/Data Collection Instrument Community members / questionnaire survey Community members/ Focus group discussion	Analysis tool SPSS Manual transcription, coding and interpretation Manual transcription, coding and interpretation.

• Various problems associated with access to water and the management of water in the various communities • The causes of these problems • How these communities solve these problems **Task 2:** To assess access to water as far as the districts is concerned and the role of the CWSA in this issue. **Indicators:** • Situation in the district as far as water is concerned • Issues associated with water resources management and water delivery in the district • Factors responsible for these issues and strategies put in place to tackle these issues • Sources of fund for their operations • Adequacy of personnel • Provisions for on-the-job training • Mechanisms put in place for rehabilitation and upgrading of reservoirs, pipes and other water resources	DWST, District Assembly/ In-depth interview	
Objective 2: To examine the extent of coordination between the community Water and Sanitation Agency and water related agencies.		
Task 1: • To find out if there has been an avenue where the CWSA has worked with other stakeholders such as the District Assembly, GWCL, NGOs and EPA etc. • Discuss example of such programmes or projects • Identify the number of times such programmes or projects have taken place	Heads of Institutions (DWST, CWSA, DA planning officer)/ Interviews	Manual transcription, coding and interpretation.

• Find out the effectiveness of such programmes or projects. • Identify the role of the CWSA in such collaborations or coordination • To draw out the extent of collaborations or coordination between the CWSA and the District Assembly		
Objective 3: To analyse the level of involvement of community members in the implementation and management of water resources and specific objectives.		
Task 1: To assess the level of community participation in water resources management. **Indicators:** • Involvement in any planning and implementation of any water project. • Time of involvement • Number of times of involvement • Number of women and men involved • Institution in charge of the last project • Involvement of traditional chiefs and assembly members in any meetings, planning, implementation and evaluation of any water project organized by the CWSA, DWST, District Assembly, NGOs etc. • Existence of WATSAN Committees **Task 2:** To assess community education and awareness progammes organised by water sectors on water resources management and practices. **Indicators:** • Cases of educational programmes on how to use and protect water resources • When such education took place • The duration of time the last education took place • The institution or organization involved • Nature of education	Community members/ stakeholders Heads of Institutions (DWST, CWSA, DA planning officer), Chiefs)	Manual transcription, coding and interpretation.

• Effectiveness of such educational programmes • **Task 3:** To explore community mobilization and initiatives in water resources management **Indicators:** • The role of the chief/assembly member in community level management of water resources • Activities organized by chief/assembly member to create awareness on the need for improving access to water and protection of water bodies • Effectiveness of such activities. • Cases where the chief/assembly member has organized meetings with community members to discuss issues concerning water • Those involved participating in such a meeting and basis for the selection of these members.		

3.6 Personal records/background data of respondents

This section describes the demographic information of the respondents. It gives the background information of the people who participated in the questionnaire study. The purpose of this section is to provide the basis for understanding and appreciating the people of the Ekumfi District and their level of dependence on water as well as how water resources affect their day to day activities. Through the understanding of these characteristics, workable policy recommendations can be made to suit the particular ecological, social, economic, cultural and community settings of the Ekumfi District and this can serve as a guide to improve coordination particularly between the government, non-governmental organizations and communities.

3.6.1 Sex of respondents

The Analysis of the Sex of respondents is categorized into Urban and Rural. Majority of the rural respondents were females making up 54% of the total while males represented 46%. For the urban communities, majority of the respondents were females as well represented by77.9% of the total whiles males constituted 22.1%. It can be concluded therefore that majority of the respondents were females. This can be explained by the fact that most of the men were absent (most had gone to their farms) during the time of visit. Table 3.2 below shows the breakdown in details.

Table 3.2: Location and sex of respondent

Setting		Frequency	Percent
Rural	Male	40	46.0
	Female	47	54.0
	Total	87	100.0
Urban	Male	25	22.1
	Female	88	77.9
	Total	113	100.0

Source: Field Survey, March to April 2014

3.6.2 Sampled communities for the study

The Ekumfi district where the survey was conducted has a few urban and several rural communities based on the definition of Ghana Statistical Service definition of urban and rural. The rural communities sampled for the study were Ekumfi Ebiram, Ekumfi Swedru, Ekumfi Abor and Techiman whiles the urban communities were Ekumfi Narkwa and Assafa. Of all, a total of 87 respondents were obtained for the rural communities whiles 113 respondents were sampled from the urban areas. Out of the 87 from the rural areas, 50.6% came from Ekumfi Abor followed by 23% from Ekumfi Ebiram. Respondents sampled from Techiman contributed 16.1% and Ekumfi Swedru was represented by 10.3%. Ekumfi Narkwa which is one of the two urban towns constituted the majority of 57.5% respondents whiles respondents from Assafa represented 42.5% of the total. As shown in table 3.3.

Table 3.3 Number of respondents in sampled communities

Setting		Frequency	Percent
Rural	Ekumfi Ebiram	20	23.0
	Ekumfi Swedru	9	10.3
	Ekumfi Abor	44	50.6
	Ekumfi Techiman	14	16.1
	Total	87	100.0
Urban	Ekumfi Narkwa	65	57.5
	Assafa	48	42.5
	Total	113	100.0

Source: Field Survey, March to April 2014

3.6.3 Educational Level of respondents

In most cases, the educational levels of respondents have a direct bearing on their understanding and appreciation of issues like that of this survey. There is therefore the need to present analysis of the educational level of the various respondents. Further, a crosstab output is generated below (Table 4.3), to show whether there is a relationship between the Sex of Respondents and their Educational level. Looking at the entire sample, it could be seen that 65 respondents making up of 32.5% of the total sample were males whereas 67.5% of the respondents were females. Out of the total percentage of the males, Table 4.3 clearly shows that majority of them represented by 12% had completed JHS whereas on the part of the females majority of them represented by 27% did not have any formal education. Again, in examining the table, it could be seen that the observed count deviate significantly from the expected count and therefore shows that the two

variables, that is Sex of Respondents and Educational Level are not independent from one another.

In comparing educational level and setting, it is observed that for the rural respondents, majority were Junior High School leavers constituting 32.2% followed by those without any education which is made up of 29.9%. Those with primary education came next with a representation of 23%. O level or Senior High School represented only 9.2% whereas Vocational or Technical training constituted 3.4%. The least category was those with tertiary education which constituted 2.3% (See Appendix 7 for Table A). On the whole, educational level for the rural respondents was low. On the side of the urban communities, majority, constituting 38.1% of the respondents had no education followed by those with only Junior High School Education (22.1%).Tertiary education made 12.4% of the total. O level or senior High School leavers constituted 11.5%. Technical/Vocational and Primary education constituted 6.2% and 4.4% respectively. Inferring from this, it shows that on the whole formal education was low in both the urban and rural communities. In all 32.5% of both male (7.5%) and female (27%) had no formal education.

Table 3.4: Sex of respondents and their educational Level

Level of education	Sex				Total	
	Male		Female			
No Formal education	15	(7.5%)	54	(27.0%)	**69**	**(34.5%)**
Primary/Elementary	12	(6.0%)	13	(6.5%)	**25**	**(12.5%)**
JHS/Middle school	24	(12.0%)	29	(14.5%)	**53**	**(26.5%)**
SHS/O level/ A level	8	(4.0%)	13	(6.5%)	**21**	**(10.5%)**
Vocational/Technical	1	(0.5%)	9	(4.5%)	**10**	**(5.0%)**
Tertiary	5	(2.5%)	11	(5.5%)	**16**	**(8.0%)**
No Answer	0	(0.0%)	6	(3.0%)	**6**	**(3.0%)**
Total	**65**	**(32.5%)**	**135**	**(67.5%)**	**200**	**(100%)**

Source: Field Survey, March to April 2014

3.6.4 Marital status of respondents

The various respondents were examined as to whether or not they were Married, Single, Separated or Divorced. Table 3.5 shows that in the rural communities, majority (55.2%) of the respondents were married. Those who were single made up 24.1% of the total. The widowed constituted 9.2% of the total. The Separated and Divorced represented 3.4% and 2.3% respectively whiles 5.7% did not give any answer. For the Urban communities, majority were also married (54%). This was followed by those who were single (19.5%). The widowed constituted 15% of the total whiles the Divorced and Separated constituted of 5.3% and 0.9% respectively. 5.3% did not answer.

Table 3.5 Marital Status of Respondent

Setting		Frequency	Percent
Rural	Single	21	24.1
	Married	48	55.2
	Divorce	2	2.3
	Separated	3	3.4
	Widowed	8	9.2
	No Answer	5	5.7
	Total	87	100.0
Urban	Single	22	19.5
	Married	61	54.0
	Divorce	6	5.3
	Separated	1	0.9
	Widowed	17	15.0
	No Answer	6	5.3
	Total	113	100.0

Source: Field Survey, March to April 2014

3.6.5 Occupation of respondents

The nature of occupation of respondent may be affected either negatively or positively by water resources management issues and vice versa. Table 3.6 is a crosstab generated output of the Sex of Respondents and their Occupation. Probing into the respondents' occupation, the data shows that respondents engaged in several activities, these included farming, trading, civil or public servant and in some cases, students. As can be seen from Table 3.6 below, the dominant occupation among respondents was farming; however, female farmers were the majority (24.5%) whereas male farmers made up only (10%). It could also be seen from the output that females dominated in all the occupational categories probably because the sample size was biased towards them. Again, looking at the observed count and the expected count in the generated output it is clearly seen that differences exist and support the argument that sex of respondents and occupation are not independent from one another. Not only this, majority of the respondents in the rural

communities also reported to engage in farming. They formed 57.5% of the total whiles the least group were those in the Civil/Public service. Farmers constituted a majority of 29.2% of the urban respondents whiles the least occupation of respondents were those involved in other occupations (2.7%) that were not listed on the questionnaire (see Appendix 7 for Table B).

Table 3.6: Sex of respondents and their occupations

Occupation	Sex				Total	
	Male		Female			
Farming	20	(10.0%)	49	(24.5%)	**69**	**(34.5%)**
Fishing	10	(5.0%)	11	(5.5%)	**21**	**(10.5%)**
Trading	1	(0.5%)	33	(16.5%)	**34**	**(17.0%)**
Civil/Public servant	15	(7.5%)	24	(12.0%)	**39**	**(19.5%)**
Student	12	(6.0%)	14	(7.0%)	**26**	**(13.0%)**
No Answer	7	(3.5%)	4	(2.0%)	**11**	**(5.5%)**
Total	**65**	**(32.5%)**	**135**	**(67.5%)**	**200**	**(100%)**

Source: Field Survey, March to April 2014

The next chapter sets in motion discussions on institutional roles in water resources management in the Ekumfi District.

CHAPTER FOUR

INSTITUTIONAL ROLES IN WATER RESOURCE MANAGEMENT IN THE EKUMFI DISTRICT

4.0 Introduction

This Chapter presents the results of data analysis and the interpretation of the results focusing on objectives one and two of the study. This section delves into the attributes of individual variables, how they relate to other variables with the aim of giving a clearer picture and significance of the data set and the variables in question.

4.1 Institutional capacity of Community Water and Sanitation Agency in the supply of safe and reliable water and the management of water resources in the Ekumfi District

This section discusses the findings on objective one of the study which is to assess the institutional capacity of the Community Water and Sanitation Agency in the supply of safe and reliable water and the management of water resources in the study area. The Community Water and Sanitation Agency was created to facilitate the provision of water to rural communities and small towns in Ghana mandated by section 2 of the Community Water and Sanitation Agency Act, 1998, Act 564. However, access to water still remains a challenge in most rural communities and this has often been blamed on the low capacity level of the CWSA as an institution. This section therefore looks into the analysis of both quantitative and qualitative data obtained on objective one of the study. Under this objective, specific tasks were designed in a way to achieve the overall aim.

4.1.1 Available Water Source and their Accessibility

4.1.1.1 Various Sources of Water

Respondents have several sources from which they get their water for various activities. For the rural communities, a significant proportion (33.3%) obtained water from pipe borne water. This was followed by those who got their water from streams or rivers representing 20.7%. Also, 14.9% of the rural respondents access water from boreholes. The least group represented by 6.9% were those who indicated get their water from community tanks. In the Urban communities, 81% of the respondents indicated that they get water from pipe borne and 4.4% also indicated hand-dug wells. Both urban communities surveyed had pipe-borne water whereas only one of the rural communities (Ebiram) had pipe-borne water. From the focus group discussions it was revealed that most of the rural community members sometimes bought pipe-borne or water from the Ochi Amissah from Mankessim to drink. They also indicated to sometimes resort to the purchase of water from water tankers who supplied water mainly accessed from the Ochi Amissah and sold from town to town.

4.1.1.2 Primary Source of Drinking Water

Clean water is a basic necessity for every human life (Mensah, 1999). However, about 75% of the people living in rural communities in Ghana regularly use water from unsafe sources (Roncha, 2012; Dei, 2011; Mensah, 1999). As stated earlier, water supply and management in the Ekumfi District is the responsibility of the Community Water and Sanitation Agency under the Community Water and Sanitation Programme. From figure 4.2, the primary source of drinking water for the rural communities were streams/rivers (25%), boreholes (18%), pipe-borne (17%), sachet water (16%). With the urban

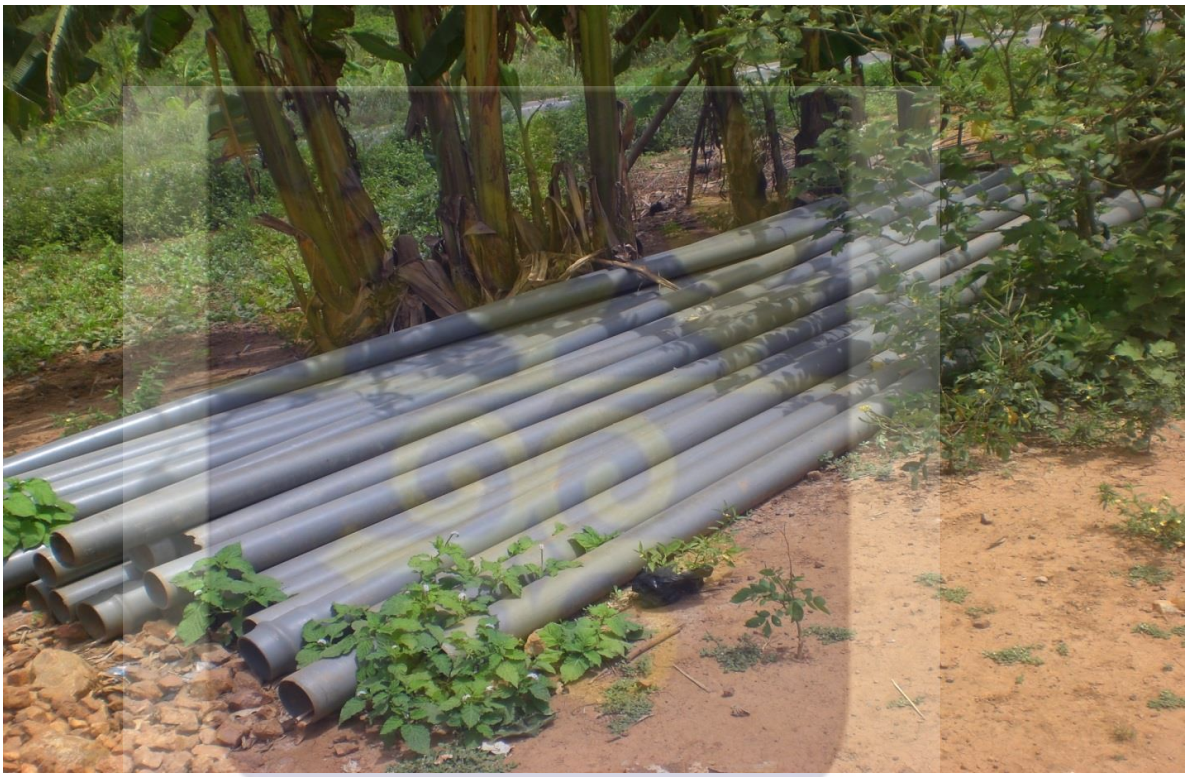
communities as shown in figure 4.3, the primary source of drinking water were indicated as follows: pipe-borne (38%), sachet water (26%), streams/rivers 15%, dug well (10%) etc. It is evident from this data that, distribution of pipe borne water is skewed in favor of the urban areas in the district. This is in line with the study of Mensah (1999), that majority of rural communities lack access to pipe-borne water and have to rely on unsafe water sources such as streams and rivers. With the focus group discussions, Maame Ama Atta of Ekumfi Abor revealed that "*our major source of water is bore hole which is also very salty. So we drink water from ponds which unfortunately are very dirty. We sometimes have to buy water from Mankessim. We suffer a lot in this community with regards to access to clean water and this has been going on for a very long time".* This was followed by an interview with the district planning officer who revealed some of the major issues associated with water resources management and water service delivery in the district. He noted,

"*there is high salinity of underground water and also drilling of boreholes has not been productive. Damages to underground pipes serving the northern sector of the district have affected distribution to several communities. There is also the issue of sand winning along river banks and tree cutting for charcoal production which is also affecting water bodies especially rivers in the district*" (Planning Officer, Ekumfi District Assembly, March 2014).

He however added that most communities in the southern parts of the district had access to pipe-borne water but communities in the northern sector were yet to have pipe-borne water. He was very hopeful that communities would be liberated from this challenge as

soon as the laying of pipelines which were on going in the northern part of the district were completed.

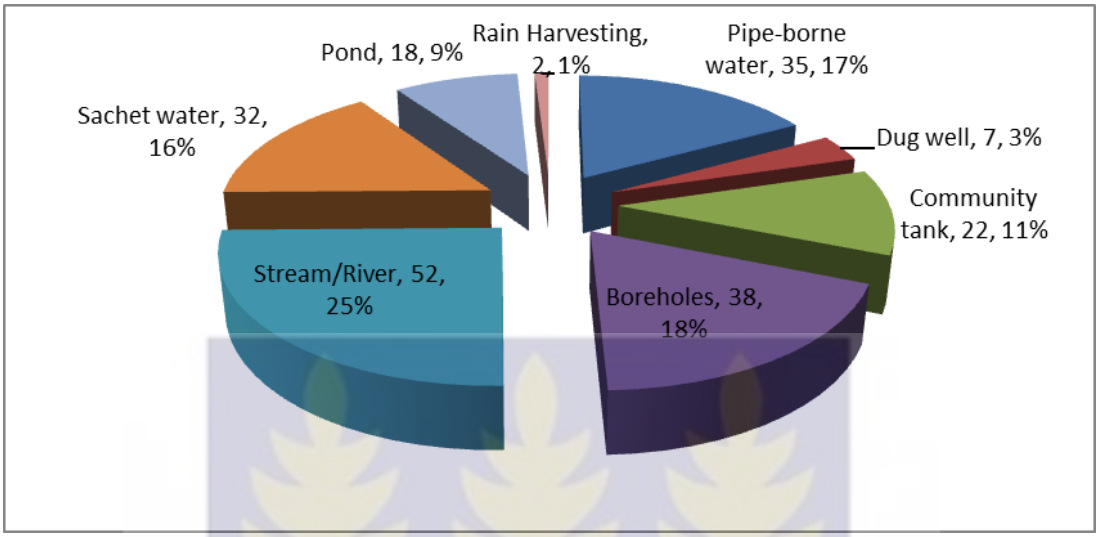
Plate 4.1: Pipes yet to be laid at Ekumfi Swedru.



Source: Field Survey, March 2014.

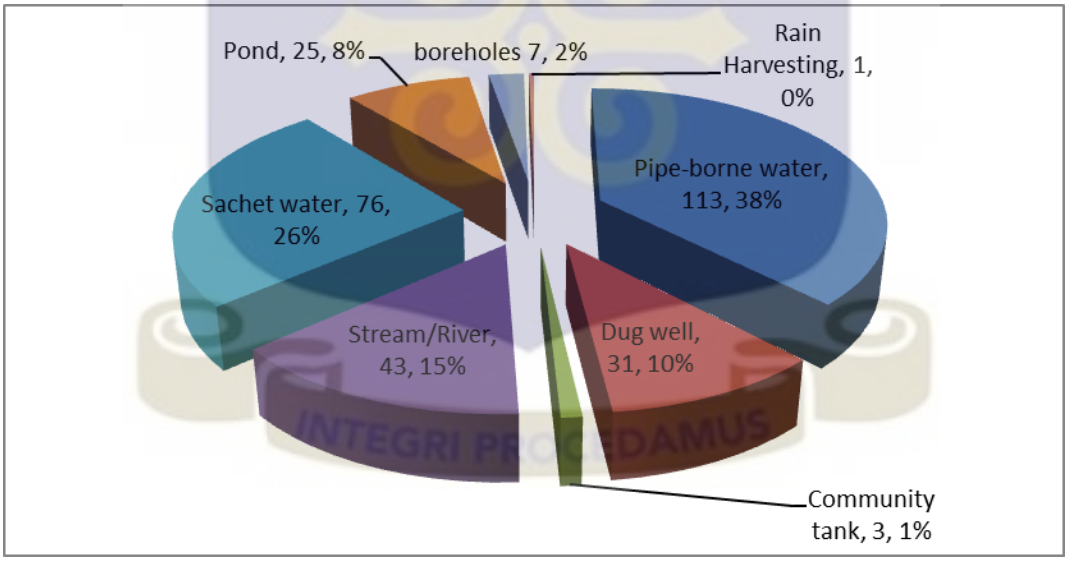
Additionally, Papa Kofi, a resident of Narkwa (considered to be urban in this study) which is located at the southern part of the district, stated in a focus group discussion that *"at first we had difficulty with access to water but we are better off now because we have pipes*" even though he added with regrets that most of the pipes had been destroyed.

Figure 4.1: Primary source of drinking water for rural communities



Source: Field Survey, March to April 2014

Figure 4.2: Primary source of drinking water for urban communities



Source: Field Survey, March to April 2014

4.1.2 Quality of Drinking Water

This study supports the position that every citizen has the right to clean water with the quality that community members find satisfactory. Water quality technically refers to the chemical, physical and biological characteristics of water (Diercing, 2009). The most form or standards of water quality assessment is usually done through the health of ecosystems, safety of human contact with the water and drinking. In this study, water quality refers to the taste, colour and cleanness of water available to community members in the district. This section therefore sought to find out the perceptions of community members on the quality of their water and whether a relationship exist between setting (rural/urban) and water quality. Table 4.6 illustrates the perception of the community dwellers on water quality whereas Tables 4.1 and 4.2 show the relationship existing between setting and water quality.

Table 4.1: Perceptions on the quality of major sources of drinking water

Setting		Frequency	Percent
Rural	Very bad	2	2.3
	Bad	23	26.4
	Good	47	54.0
	Very good	10	11.5
	No Response	5	5.7
	Total	87	100.0
Urban	Very bad	1	.9
	Bad	17	15.0
	Good	94	83.2
	Very good	1	.9
	Total	113	100.0

Source: Field Survey, March to April 2014.

Table 4.2 Relationship between setting and respondents perception of quality of drinking water

Quality of drinking water	Place of Residence				Total	
	Rural		Urban			
Very bad	2	(1.0%)	1	(0.5%)	**3**	**(1.5%)**
Bad	23	(11.5%)	17	(8.5%)	**40**	**(20.0%)**
Good	47	(23.5%)	94	(47.0%)	**141**	**(70.5%)**
Very good	10	(5.0%)	1	(0.5%)	**11**	**(5.5%)**
No answer	5	(2.5%)	0	(0.0%)	**5**	**(2.5%)**
Total	**87**	**(43.5%)**	**113**	**(56.5%)**	**200**	**(100%)**

Source: Field data, 2014 **Chi square (X^2) value= 26.329, df (4), P value <0.05**

(Figures in parenthesis represent percentages)

Potable water is water of sufficiently high quality that can be consumed or used with low risk of immediate or long term harm. Access to potable water has the tendency to reduce water borne diseases such as guinea worm, bilharzia, cholera, etc. As such, further analysis was done into the quality of water obtained**.** For both rural and urban communities, majority were of the view that the quality of their water was good represented by 54% and 83% respectively. However, a relatively higher proportion of respondents in the urban than the rural indicated the quality of water was good. This is mainly due to the fact that the urban communities in this study have pipe-borne water. Again in the rural communities, a total of 26.4% indicated that their water was of bad quality whiles only 15% of the urban respondents shared the same sentiment. It could therefore be deduced that the quality of water in the urban communities was better than

that of the rural communities by examining the observed count and the expected count on the crosstab output (see Table 4.2). However, the same output shows 5% of the rural respondents rated their drinking water as very good whereas urban respondents were represented by 0.5% thereby presenting an interesting scenario which makes it difficult for one to conclusively state that setting and quality of drinking water are independent from one another. More importantly, conducting a chi-square test of independence shows that the observed pattern is statistically different from the pattern expected due to change. The chi-square test further illustrates that the large chi-square statistic (26.329) and its small significant level ($p < 0.000$) indicate that the two variables (settings and quality of drinking water) are not independent of each other and that one can reject that there is no relationship between the quality of drinking water and setting (rural/urban). Therefore this section concludes categorically that there is a significant relationship between setting and quality of drinking water.

In support of the statistical analysis are the discussions and interviews in both the rural and urban areas as stated as follows; Peter from Narkwa asserted that "*the quality of pipe-borne water supplied to us is fairly good. It only becomes a problem when the pipe burst somewhere. That is when the colour of the water we get from the pipes turn orange in colour, other than that, the quality is fairly good like I said earlier".* John, also from the same community interrupted by asserting bitterly that, *"as for me, I don't like the quality of the pipe-borne water supplied. It does not taste good at all. I have to buy sachet water to drink all the time because of the quality of the water"*.

These comments were however not peculiar only to the urban communities. In Ebiram which is the only rural community with pipe-borne water, out of the four rural

communities sampled for this study, the assembly man for the area in an interview was not satisfied with the quality of pipe-borne water supplied to the community. He complained of frequent discoloration of water supplied and the saltiness of the pipe-borne water. Kojo of the same community also complained that "*as for me I prefer to drink water from the Ochi than from the pipe. It is just unfortunate now that the ochi is salty because we are in the dry season so I am being forced to drink pipe-borne water. I just do not like how the pipe-borne water tastes".*

The story was however different with members of Ekumfi Abor, Techiman and Swedru communities who did not have access to pipe-borne water at all and had to rely on bore holes, hand dug wells, etc. Maame Efua of Abor stated that *"the boreholes are very salty and other sources of water are also very dirty. It is very sad what we go through in this community"*. It could be concluded from this section based on the statistical analysis and the interviews that to a larger degree, setting (rural/urban) has a significant relationship with quality of drinking water.

4.1.3 Location of sources of drinking water

Accessibility to water partly depends on where the source of water is located. The result of the study show that in both rural (70.1%) and urban (76.1) communities, the majority got water from sources located in the community. About 18% of the responses from the rural communities indicated that their sources of water were located in other villages or towns. In the case of the urban communities, 18.6% stated that their water was located in the compound of their homes. This clearly suggests that those in urban communities have their water source closer to them than those in the rural communities **(See Appendix 7 for Table C for details).**

Table 4.3 shows the relationship between type of community and sources of their water. Buttressing this position is the chi-square test that reveals a somewhat high chi-square value of 28.251 with the p value being 0.000. The low P value together with the high chi-square value corroborates the earlier position that setting has a very significant relationship with sources of water.

Table 4.3: Relationship between location of water sources and place of residence

Location of sources of water	Place of Residence				Total	
	Rural		Urban			
In the compound	2	(1.0%)	21	(10.5%)	**23**	**(11.5%)**
In the community (Public)	61	(30.5%)	86	(43.0%)	**147**	**(73.5%)**
In other villages/towns	16	(8.0%)	5	(2.5%)	**21**	**(10.5%)**
No answer	8	(4.0%)	1	(0.5%)	**9**	**(4.5%)**
Total	**87**	**(43.5%)**	**113**	**(56.5%)**	**200**	**(100%)**

Chi square (X^2) value= 28.251, df (3), P value <0.05 (Figures in parenthesis represent percentages)

Sources: Field Survey, March to April 2014.

4.1.4 Distance of source of drinking water from home of respondents

Both rural (73.6%) and urban (99.1%) respondents indicated that their water sources were located less than 1 km from them. However, 18.4% of the rural respondents indicated that their water source was located between 1 km and 3 km from their homes. **(see Appendix seven for Table D).**

Table 4.4: Relationship between distances of water sources from place of residence

Distance of water sources from home	Place of Residence				Total	
	Rural		Urban			
Less than 1km	64	(32.0%)	112	(56.0%)	**176**	**(88.0%)**
Between 1km-3km	16	(8.0%)	0	(0.0%)	**16**	**(8.0%)**
No Answer	7	(3.5%)	1	(0.5%)	**8**	**(4.0%)**
Total	**87**	**(43.5%)**	**113**	**(56.5%)**	**200**	**(100%)**

Chi square (X^2) value= 30.730, df (2), P value <0.05

(Figures in parenthesis represent percentages)

Source: Field Survey, March to April, 2014.

With regards to the Table 4.14, the community that had the most issue with distance is Ekumfi Swedru where the only water source which was a borehole had broken down and community members had to walk about 1km to Mankessim to fetch water from the Ochi Amisa. *"the only borehole we have in this community is spoilt so we have locked it to prevent further damages. We have to walk all the way from here to Mankessim to fetch water which is not only far but dangerous as well because of the high way. People sometimes get knocked down by cars"* Maame Akosua, Ekumfi Swedru. This is in support of Mensah (1999) who argued that it takes long distances and long hours for people especially women to gain access to water in most developing countries. He further added that the methods of carrying water and getting access to water in general also leads to physical injury.

Plate 4.2: Spoilt mechanized borehole at Ekumfi Swedru

Source: Field Survey, March 2014

4.1.5 Access to drinking water at any time

Respondents were asked as to whether they had access to water at any time or whenever they wanted to. Majority of the respondents for rural (55.2%) and urban (91.2. %) indicated that they did. About 40% of the rural respondents did not get ready access compared with about 9% of the urban respondents as shown in Table 4.5.

Table 4.5: Type of community and their ability to access water from source every time

Setting		Frequency	Percent
Rural	Yes	48	55.2
	No	35	40.2
	NR/NA	4	4.6
	Total	87	100.0
Urban	Yes	103	91.2
	No	10	8.8
	Total	113	100.0

Source: Field Survey, March to April 2014

4.1.6 Reason for not having access to drinking water all the time

For those who indicated they did not get access to water always, further enquiry was made to find out the reasons behind such times. Table 4.15 shows that for both the rural and urban respondents, the major reason indicated was shortage of water mainly during times when water pumps broke down or on pipe-borne water off days.

Table 4.6 Reason for not having access to drinking water always

Setting		Frequency	Percent
Rural	Shortage	34	96
	No Answer	1	2.9
	Total	35	100.0
Urban			
	Shortage	8	80
	No answer	2	20
	Total	10	100.0

Sources: Field Survey, March to April 2014

4.1.7 Cost of water

Water gained from traditional sources such as rivers and streams come at no cost to communities who have access to them (Mensah, 1999). However, access to water under the CWSP is a demand driven programme as stated earlier. The water provided under the CWSP has to be paid for and as indicated in chapter two, the amount paid for water is determined by the WATSAN in consultation with the community. Water therefore, does not always come free to communities. They pay some amount of money for it in some cases. Analysing the cost respondents bear for all types of water they obtained within a day shows that the highest amount paid by 33.3% of the respondents from the rural communities was between GH ¢1.8 to GH ¢ 2.3 ,whiles in the case of the urban communities, 46% of the respondents paid between 60ps to 1.10GH Cedis. It can be concluded therefore that water is more expensive in the rural communities than the urban communities **(see Appendix for Table E)**.

When the same variables are subjected to the chi-square test, the result shows that, there is a strong relationship between setting and money spent on water per day. As shown in Table 4.7, the Pearson t-statistic and p-value result of 31.165 and 0.000 respectively indicated a relationship between the kind of setting and the amount of money spent on water per day. Since the p-value of 0.000 is less than 0.05 there is a significant difference between setting and the amount of money spent on water per day. **(See table 4.7)**

From the interviews and discussions, the high rate of money spent on water in the rural areas is because some of the community members fetch water from the Ochi Amissah in Mankessim which was free or pipe-borne water at a cost in addition to the transportation cost involved was what attributed to the high cost of water in rural communities. Some

also bought water from water tankers from Mankessim which went to these rural communities to sell water to them at a cost which was high compared to what communities with pipe-borne water spent on a bucket of water.

Table 4.7 Relationship between cost of water and setting (rural/urban)

Money spent on water per day	Setting				Total	
	Rural		Urban			
0-50p	29	(14.5%)	53	(26.5%)	**82**	**(41.0%)**
60p- 1.10 GH₵	3	(1.5%)	20	(10.0%)	**23**	**(11.5%)**
1.20GH₵- 1.70GH₵	4	(2.0%)	13	(6.5%)	**17**	**(8.5%)**
1.80GH₵- 2.30GH₵	37	(18.5%)	27	(13.5%)	**64**	**(32.0%)**
No answer	14	(7.0%)	0	(7.0%)	**14**	**(7.0%)**
Total	**87**	**(43.5%)**	**113**	**(56.5%)**	**200**	**(100%)**

Source: Field data, March2014 **Chi square (X^2) value= 31.165, df (4), p value <0.05 (Figures in parenthesis represent percentages)**

4.1.8 Buckets/gallons of water collected per day

In communities that depend solely on traditional sources of water, access to water and amount collected is dependent on time of the year (Odame-Ababio, 2002; Mensah, 1999). In the raining seasons when water is in abundance, a person can collect as much water depending on the distance and a person's strength. In the dry season however, when these sources of water dry up, people have to walk long distances and therefore usually fetch less water. under the CWSP, interruptions in water supply and access to water for that matter is usually caused by break down of parts of water supply systems (Mensah, 1999).

Concerning the quantity of water that is collected everyday by respondents for their household indicated that majority (50.4%) of urban respondents gathered about 5 to 10 gallons or buckets of water daily. For rural communities, 50.6% of the respondents indicated that water collected per household was between 5 to 10 gallons or buckets a day. So, more than 50% of the respondents in both rural and urban communities said their households collected between 5 and 10 buckets of water per day. Table 4.8 shows the details of the amount of gallons/buckets of water gathered per households by the remaining percentages.

Table 4.8 Buckets/gallons of water collected per day

Setting		Frequency	Percent
Rural	Less than 5 buckets/gallons	20	23.0
	Between 5 and 10 buckets/gallons	44	50.6
	10 and above	23	26.4
	Total	87	100.0
Urban	Less than 5 buckets/gallons	32	28.3
	Between 5 and 10 buckets/gallons	57	50.4
	10 and above	24	21.2
	Total	113	100.0

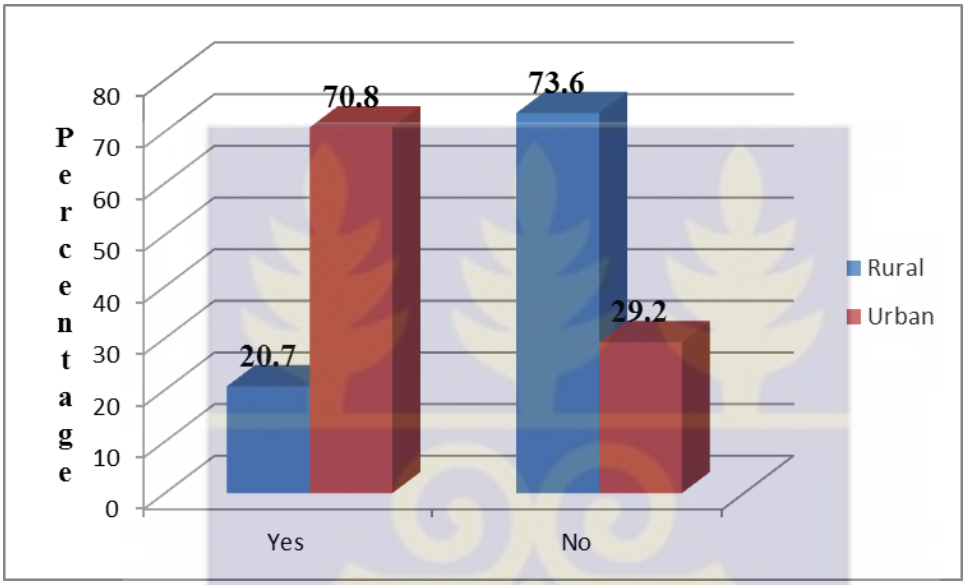
Source: Field Survey, March to April, 2014.

4.1.9 Adequacy of water fetched or collected daily

Another issue investigated was whether or not the water obtained was adequate. Concerning adequacy, about 71% of the respondents in the urban centres indicated that the water fetched per day was adequate. However, for the rural respondents, majority (73.6%) revealed that water collected was not enough for them. It could be deduced from

this that urban respondents were more satisfied with water collected per day than the rural respondents. (See figure 4.5).

Figure 4.3: Adequacy of water fetched per day



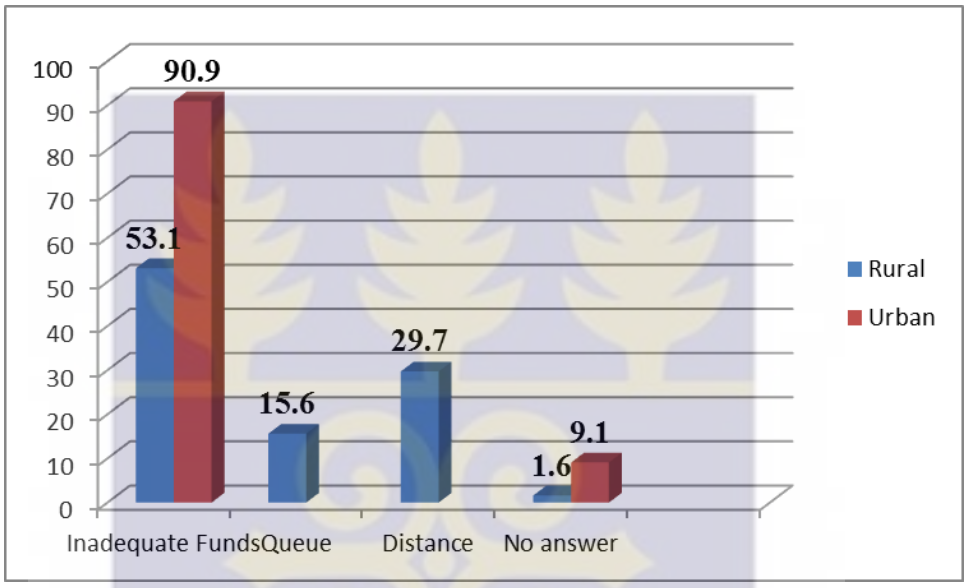
Source: Field Survey, March to April 2014

4.1.10 Reasons for inadequacy of quantity of water fetched for a day

To critically examine the issue of adequacy or inadequacy of water supplied, further enquiry was made into some of the reasons that could account for why water collected per day was not adequate for the household especially for those who indicated so. For the rural communities, 53.1% of the 64 respondents who indicated "no" to the previous question gave reason as the lack of adequate funds. About 90% of the 33 urban respondents who ticked "no" to this same question also indicated inadequate funds as the reason why water fetched per day could not satisfy their needs. The second factor represented by 29.7%, as responsible for the inadequacy of water fetched for the rural

respondents was the distance they had to cover to get water which was quite the opposite for the urban community respondents. Figure 4.4 below shows the details.

Figure 4.4: Reasons for inadequacy of water fetched per day

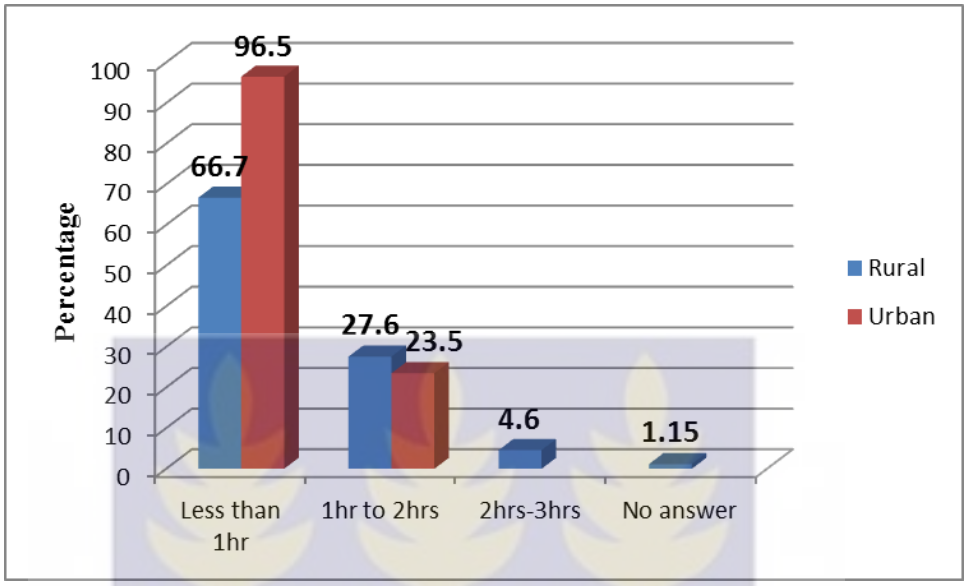


Source: Field Data, March to April, 2014.

4.1.11 Average time spent on collecting water per day

Aside the cost of water, time is a very important factor with respect to accessibility of water. Majority of respondents both in the urban communities (96.5%) and the rural communities (66.7%) indicated that they spent less than 1 hour to access water. However more of the rural respondents spent time in accessing water unlike respondents from the urban communities who spent between 1 to 2 hours. See figure 4.5 below.

Figure 4.5: Perceptions on time spent on water collection



Source: Field Survey, March to April 2014.

4.1.12 Reasons for time spent collecting water daily

Enquiries were also made into the time spent on getting water. This was based on the assumption that, certain factors worth investigating were responsible for the time spent by respondents in getting access to water. Queuing especially in the morning was indicated as one of the major contributing factors to the time spent getting water for the rural community respondents. The major contributing factor for the rural respondents was however, distance. For the Urban respondents, 17.7% and 44.2% indicated distance and queuing respectively as the reasons for the time they spent in collecting water. (See table 4.9).

Table 4.9: Reasons for time spent collecting water daily

Setting	Reasons	Frequency	Percent
Rural	Distance	52	59.8
	Queuing	35	40.2
	Total	87	100.0
Urban	Queuing	50	44.2
	Distance Large family size	20 41	17.7 36.3
	No Answer/ Blank	2	1.8
	Total	113	100.0

Source: Field Survey, March to April 2014.

4.1.13 Recent changes in access to waters (within the last 5 - 10yrs)

The state or conditions surrounding water supply in the communities might have changed with time. Respondents expressed their opinions as tabulated in Table 4.10 below which shows that majority of the respondents agreed that there had been some changes. About thirty five percent (34.5%) of rural respondents and 97.3% of urban respondents agreed that there had been some changes. It was discovered from the interviews and focus group discussions in the rural communities sampled for this study that access to water had declined in the rural communities with the exception of Ebiram, as opposed to improvement in access to water in the urban communities. Papa Kweku from Ekumfi Techiman asserted that "*at first we had abundant water but now the rains do not even come anymore to fill our tanks and other sources of water*".

Table 4.10: Communities and recent change in access to water (within the last 5-10yrs)

Setting		Frequency	Percent
Rural	Yes	30	34.5
	No	48	55.2
	No Answer	9	10.3
	Total	87	100.0
Urban	Yes	110	97.3
	No	1	20.9
	No Answer	2	1.8
	Total	113	100.0

Source: Field Survey, March to April 2014.

4.1.14 Kinds of change that have occurred in access to water

For those who agreed that there had been some changes in the conditions of water supply, further probing was done to find out if there had been some improvement or deterioration with regards to access to water. For the urban communities, almost all of the respondents (90.9) indicated that there had been some improvement. Some 66.7% of the 30 rural respondents who responded to the question agreed that there has been some kind of improvement. (See Table 4.11).

Table 4.11 Kind of changes that have occurred in access to water

Setting	Changes	Frequency	Percent
Rural	Improvement	20	66.7
	Deterioration	9	30
	No Answer/ Blank	1	3.3
	Total	30	100.0
Urban	Improvement	100	90.9
	Deterioration	10	9.1
	Total	110	100.0

Sources: Field Survey, March to April 2014.

4.1.15 Challenges and opportunities of the District Water and Sanitation Team

The capacity of the CWSA to adequately cater for water needs of the rural and small town levels is also largely dependent on a range of factors. This does not only cover water supply or access to water but include: data collection and management; monitoring frameworks; information dissemination; funding; adequacy of personnel; as well as mechanisms in place for rehabilitation and upgrading of reservoirs which bothers on the skills training and enhancement of personnel as well as community members(MWRWH, 2007). In examining the capacity of the CWSA, this study also sought to find out the extent to which the above characteristics were being managed by the DWST in the Ekumfi District. These management instruments (such as data collection, monitoring frameworks etc.) enable stakeholders to make rational alternative actions (Saravanan et al., 2009).

From an interview with the district focal person of the DWST, it was revealed that regular visits were made by building inspectors and statutory planning committee

meetings were held regularly as a means of monitoring settlements along river banks. Upon an interview with the district planning officer also revealed that in collaborations with the DWST, environmental health officers and community development officers occasionally went round to check the effects of water management enhancement project which were normally established in communities in the district to enhance the management of water resources in the district. The team also did frequent monitoring of WATSAN Committee activities (such as organisation of meetings, documentation of meetings, fund mobilisation as well as planning and undertaking of health and hygiene education).

Water resource assessment entails undertaking water resources assessment, starting with the collection of hydrological, physiographic, demographic and socio-economic data assembly and reporting (Saravanan et al., 2009; Jonch-Clausen, 2004). Jonch-Clausen (2004) explains that the way to improve knowledge among stakeholders for better water management will involve sharing methods and technologies which will automatically improve the stakeholder's access to information stored in public domain data banks. One of the responsibilities of the DWST as stated by MAPLE consult is that the DWST must collect and collate data on water and sanitation activities and facilities. This is very essential particularly in the preparation of DWST plans. The DWST therefore needs to collect data from Assembly members and other stakeholders on available water facilities in the district as well as population of communities, NGOs operating in the sector, water and sanitation associated disease, community initiated projects, community-based voluntary associations etc. Upon enquiries based on the necessity of the collection and management of data on water resources in the district, the DWST focal person

acknowledged "*data on water resources is collected by the Planning Unit and the District Water and Sanitation-Team (DWST) and managed by the DWST*". He added that "*the data is used to determine accessibility to potable water and prioritisation of communities*".

Financing and incentive mechanisms form an integral part of water resources management basically because the financial needs of the water sector are huge and water projects cost a lot of money (GWP, 2004). On the issue of funding, it was highlighted that funding sources were mostly from internally generated funds, central government and donor support. External funding sources were noted to include International Development Association on Sustainable Rural Water and Sanitation Project (IDA-SRWSP) and District Development Facility (DDF). However, funding was acknowledged to be low which hampers the smooth operation of the DWST. This confirms the views of Saravanan et al (2009) who believe that the role of funding in the sustainability of water resources management cannot be taken for granted. They assert that, water resources management strategies become highly questionable when financing is limited (Saravanan et al., 2009).

The adequacy of personnel in water resources management at the institutional level in the district cannot be overlooked. It was noted that there were adequate personnel. Further enquiries on the mechanisms put in place for the rehabilitation and upgrading of reservoirs, pipes and other water resources revealed that water from pipes and boreholes were sold to people of the various communities and the revenue raised were used to rehabilitate and upgrade them. The Water and Sanitation Committees at the community levels were therefore in charge of the maintenance and operation of water facilities.

To ascertain what was really on the ground, some traditional heads, assembly representatives and WATSAN Committee members were interviewed. One elder lamented that "*when pipe burst in this community, I have to call the CWSA people because no one is trained to fix pipes in this community. I have to call them several times before they come and fix it. I have been calling them several times for about three days now to come and fix the one that has burst close to the lorry station*" (Papa Nimo, Narkwa). He further revealed that the WATSAN Committee in the community was no longer functioning. Similarly, the assembly man of Ebiram revealed that there was no body in the community trained to fix faulty pipes and they always have to depend on the DWST people.

The situation was the same in Ekumfi Abor, Ekumfi Techiman and even worse in Ekumfi Swedru whose only borehole had broken down for over a year and because no one in the community could fix it, the facility had been locked and they had to walk about 1km to fetch water from Mankessim as stated earlier.

As at 2007, the MWRWH, enumerated that the main capacity building and awareness creation challenges included:

i. ensuring training and retention of adequate number of sector professionals;

ii. ensuring adequate capacity encompassing administrative, financial, technical, logistical provisions;

iii. ensuring effective dissemination of information to enable decision making by public on progress towards MDGs; and

iv. developing and maintain institutional structures responsive to the need for sustainable management of water resources.

Plate 4.3: A burst pipe at Narkwa during the time of survey.

Source: Field Survey, March 2014.

Strategies for the above challenges as stated in the Ghana Water Policy included a plan to "*develop and strengthen human resources and institutional and operational policies"*. It can be concluded from the analysis so far, these challenges still persist despite the plans to address them. The question still remain as to whether policies just remain on paper or truly implemented on the ground.

4.2 Nature and extent of coordination between the Community Water and Agency and other water related agencies.

Water resources management has gone through a paradigm shift from one that was sector fragmented to one that is multi-sectoral in nature involving various institutions where collective decisions are made to solve the complex issues associated with water resources management (MWRWH, 2007). This type of management recognizes resources in their entirety and advocates for policies and frameworks as well as plans and systems of actions that will ensure coordination between institutions active in the water sector (GWP, 2000). With regards to coordination, the CWSA must coordinate activities with district assemblies by providing them with technical support required for executing water and sanitation projects; coordinate activities of NGOs involved in the provision of water, sanitation and hygiene education; collaborate with the Ministry of Environment, Health and Education, Water Resources Commission etc. in increasing consciousness about water related hazards and also set standards for the provision of water and sanitation services. It must also collaborate with International agencies, among others.

It is against this background that objective two of the study sought to examine the extent of coordination between the CWSA and other water related agencies in the execution of water resources management strategies and projects.

From the interviews conducted, the study found out that there were frequent avenues where the DWST had worked with other stakeholders and an example of such avenue was the collaboration with stakeholders of International Development Association on Sustainable Rural Water and Sanitation Project in the district. Considering the close nature in which the DWST is supposed to work with the District Assembly, the District

planning officer indicated that *"more borehole projects are implemented by the assembly in collaboration with the CWSA".* It was also revealed that such programmes took place all year round.

In finding out the effectiveness of such collaborations and coordination of programmes between the CWSA and other water related agencies especially the district assembly, it was highlighted by the DWST that such programmes had led to the provision of water facilities. It had also facilitated the capacity building of communities in the operation and maintenance of facilities. Institution wise, benefits also accrued from such collaborations and this was evident from the statement of the district planning officer that *"such collaborations are very important because the collaborations enable the assembly to implement water projects smoothly*". The DWST and the District Assembly collaborate on such important roles as providing financial support, provision of supervision and monitoring of construction of water facilities and the provision of land for water projects. The DWST focal person finally revealed that *"collaboration and coordination between the CWSA and the Assembly, GWCL, NGOs and CBOs have gone far because the DWST alone cannot manage water resources in this district".*

These factors go to support the assertion of Saravanan et al (2009) that water resources management issues are far too complex and can only be overcome when different actors in the water sector supply a pool of wide knowledge base in the designing and implementations of policies and strategies in a consensus manner.

4.3 Summary and conclusions

The chapter sought to investigate the capacity of the CWSA (DWST since this work was conducted at the district level) by looking into water supply and the opportunities as well as the challenges of CWSA as the statutory institution in charge of water in the district. From the findings, potable water supply is very low especially in the rural areas in the district and these communities have to rely on unwholesome sources of water for their daily activities and survival in general.

It was also revealed that even though the DWST has put in place certain mechanisms to ensure effective monitoring, gathering and dissemination of information on water resources, the institution falls short in raising enough funds and also the ability to put in place proper mechanisms for rehabilitation and upgrading of reservoirs, pipes and other water resources.

The section also examined the extent of coordination between the CWSA (DWST since the study was done at the district level) and other water related agencies in the execution of water resources management strategies and projects. The study revealed that the CWSA recognizes the importance of coordination and collaborations due to the complex nature of water resources and therefore works in close coordination with water related sectors especially the district assembly. However, it was observed that even though there is a strong coordination between the DWST and the district assembly, coordination and collaboration between the DWST and other water related sectors is low. These findings are similar to Dei (2011) in his study of water resources management for socio-economic development in the Pru and Atebubu-Amanten districts of Ghana. His study revealed similar deficiencies in the level of coordination between water related sectors, in that

collaborations and coordination that exist among water related institutions are usually identified to be very weak between and within such institutions (Dei, 2011).

Having dealt with the institutional capacity of the CWSA as well as the nature and extent of coordination between the CWSA and other stake holders, the next chapter digs deeper by assessing participation of community members in the planning, implementation and management of water projects meant for their own use. The next chapter also takes a critical look at existing laws and regulations governing water, their effectiveness and most importantly the adherence level of community members.

CHAPTER FIVE

COMMUNITY PARTICIPATION IN WATER RESOURCES MANAGEMENT AND KNOWLEDGE ON LAWS AND REGULATIONS GOVERNING WATER

5.0 Introduction

Community participation is the involvement of community members in projects that are meant for them or projects that affect them. Participation has been closely linked to equity in that this paradigm focuses on weaker sections of the society which comprises the poor, the landless and most especially, women (UN-Water, 2011; Essaw, 2007). Mensah (1999:24) endorses the importance of participation of community members in water resources management by arguing that communities supply "*a wealth of knowledge about local environment that can never be provided by an outsider".* It is against this background that this chapter highlights the findings of objective three of the study which sought to analyse the level of involvement of community members in the implementation and management of water resources and projects. This chapter also looks into the existing laws and regulations put in place to check practices which have adverse effects on water resources and the environment as a whole which is the objective four of the study.

5.1 Community participation in water resources management

5.1.0 Introduction

Boyne (2007), argues that community participation must be deepened in the provision and management of water resources, especially, water facilities. Community participation in water resources management especially in the construction of water facilities can either be at the planning, implementation and evaluation stages.

5.1.1 Involvement in planning and implementation of water projects

Community members were asked as to whether or not they had ever been involved in planning and implementation of water projects. Majority of the respondents for both rural and urban communities indicated that, they had been involved in the planning and implementation of water projects represented by 59.8% and 87.6% respectively. However 40.2% of the rural respondents indicated that they had not been involved in any water projects whereas 12.4% of the urban dwellers gave same answer. Table 5.1 below shows the details.

Table 5.1: Involvement in planning and implementation of water project

Setting		Frequency	Percent
Rural	Yes	52	59.8
	No	35	40.2
	Total	87	100.0
Urban	Yes	99	87.6
	No	14	12.4
	Total	113	100.0

Source: Field Survey, March to April 2014

In support of the above data, the focus group discussions revealed that the pipes in the communities were provided by the district assembly and the CWSA but community members especially the men were involved in the digging and laying of pipe lines. Specifically, Bob of Ekumfi Ebiram added that "*I was personally involved in the laying of trenches for pipe lines. Most of the young men in this community were involved".* This reveals that there was some sort of community participation in the implementation of water projects even though participation is low.

Furthermore, from interviews with traditional heads and assembly members of the sampled communities, it was discovered that of all the six communities, only two had a functioning WATSAN committee. This is rather unfortunate as the WATSAN committee serves as the mediator between the community and the DWST. Considering the various pivotal roles of the WATSAN committees as stated earlier in the study, their absence poses a serious threat to effective community participation in water resources management.

5.1.2 Time of involvement

For those who were involved in the planning and implementation, further probing was done as to which year they were involved. Majority of the rural respondents (66.7%) indicated that they had been involved in some projects within the last four years (ie 2010 to 2014). The same results were obtained in the case of the urban respondents (98.1%). Some of the rural respondents also indicated that they had been involved in a project or two, in 2006 and 2009 (see Table 5.2).

Table 5.2: Residents involvement in planning and implementation of water projects.

Setting		Frequency	Percent
Rural	2002 – 2005	10	11.5
	2006 – 2009	14	16.1
	2010 – Date	58	66.7
	No Response	5	5.7
	Total	87	100
Urban	2010 – Date	110	98.1
	No Response	6	5.3
	Total	113	100.0

Source: Field Survey, March to April 2014

5.1.3 Frequency of involvement in the planning and implementation of water projects

Again, for those who indicated that they had been involved in planning and implementation, further enquiry was made into how frequent they had been involved. It was evident from the responses that majority of rural respondents indicated they had never been involved. For the few who were involved, 32.2% of the rural respondents indicated that it was just once and 3.4% indicated that they have participated in about three or more projects. For the urban respondents, 17.7% indicated that they had been involved in three or more projects whiles 69.9% showed they had partaken in only one water project. Table 5.3 reveals this.

Table 5.3: Frequency of involvement in water project planning and implementation

Setting	Frequency	Frequency	Percent
Rural	Once	28	32.2
	Thrice or above	7	3.4
	Never been involved	52	59.8
	Total	87	100.0
Urban	Once	99	69.9
	Thrice or above	20	17.7
	Never been involved	14	12.4
	Total	113	100.0

Source: Field Survey, March to April 2014

5.1.4 Number of men and women involved in the last water related project undertaken

The participation of minority groups whose voices are often ignored especially women has become a very important issue in development especially in a developing country such as Ghana (Mensah, 1999). This is particularly because women are the primary collectors of water and therefore have special interest in water in ensuring the availability of water. It is for this reason that it has been widely accepted that important roles should be given to women in the management and control of water resources. An understanding of gender issues in water resources management requires a look into the representation of both men and women in water resources management. In the light of that, this study discovered that for rural communities, 24.1% men and 16.1% women were involved in the last project and for urban, 8.0% men and 4.0% women were involved in the last project they partook in. The rest did respond that projects normally involved the whole community and in such cases all men and women were involved (see Table 5.4).

However, during the focus group discussions, it was revealed that in cases where, projects were being done in communities, the whole community would be invited to participate normally in the planning stages. For example, in Ekumfi Abor, Esi said "*during the construction of a water facility by Blue Skies Company, all community members were called to meet in the market and we were asked to decide on whether we wanted a solar powered water facility or an ECG powered one, so we chose ECG powered one".* And although most of the community members of Ekumfi Abor shared the same view, one Awo commented that *"no body was invited. The Blue Sky Company executives met with the chiefs and did their own thing. I saw them when they were*

planning and eating the foods that were provided, all by themselves. They did not involve anybody".

At the district level, findings from an interview with the DWST revealed that normally, equal number of men and women were involved in the planning and execution of water projects and district meetings on water resources management.

Table 5.4 Number of men and women involved in the last project undertaken

Setting		Frequency	Percent
Rural	Men	21	24.1
	Women	14	16.1
	The whole community	52	59.8
	Total	87	100.0
Urban	Men	9	8.0
	Women	5	4.4
	The whole community	99	87.6
	Total	113	100.0

Source: Field Survey, March to April 2014

These findings agree with that of Boyne (2007) who argues that men dominate in the management of natural resources in general.

5.1.5 Institutions in charge of project

Further inquiries were made into the various projects undertaken in communities and the institutions that instigated or were in charge of water projects in these communities. These institutions could be governmental or non-governmental organizations or the

communities themselves. Analysis of the various institutions involved in the last water projects are shown in (Table 5.5 below).

Table 5.5 Institution(s) involved in last water project

Setting		Frequency	Percent
Rural	The Community	53	60.9
	Government Body	13	14.9
	Non-Government Organization	7	8.0
	No Idea	14	16.1
	Total	87	100.0
Urban	The Community	21	18.6
	Government Body	86	76.1
	Non-Government Organization	5	4.4
	No Idea	1	0.9
	Total	113	100.0

Source: Field Survey, March to April 2014.

5.1.6 Respondents disengagement in planning and implementation of water projects

Various reasons were given by some respondents concerning why they were not involved in water projects whenever there were any. For the rural respondents, Table 5.6 shows that 12.6% of them had no idea why they were not involved whiles another 80.5% indicated that it was because the participants were normally selected. For the urban respondents, 52.2% indicated that they had no idea whereas 25.7% of them also stated that the members for the planning and implementation of water project were selected elders from various sections of the communities. (See Table 5.6)

Table 5.6: Respondents Perceptions on non-participation in water projects

Setting	Reasons	Frequency	Percent
Rural	No Idea	11	12.6
	Selected Members	70	80.5
	No Response	6	6.9
	Total	87	100.0
Urban	No Project	19	16.8
	No Idea	59	52.2
	Selected Members	29	25.7
	No Response	6	31.9
	Total	113	100.0

Sources: Field Survey, March to April 2014.

5.1.7 Education on use and protection of water resources

Education brings about enlightenment so that individuals can make informed decisions. Analysis of whether or not respondents had had any education on the protection and use of water shows that majority of rural (77%) and urban(62.8) residents indicated that they had some education in their respected communities. However, it is evident that percentage wise, more rural respondents than urban respondents had benefited from community education and sensitization on water. (See Table 5.7).

Table 5.7: Education on use and protection of water sources

Setting		Frequency	Percent
Rural	Yes	67	77.0
	No	20	23.0
	Total	87	100.0
Urban	Yes	71	62.8
	No	42	37.2
	Total	113	100.0

Source: Field Survey, March to April 2014.

Interview with the DWST focal person revealed that

> *"the DWST, with the district assembly and collaboration with the Ghana Health Service do periodic sensitisation in the communities"*. The Planning Officer also added that "*the Water and Sanitation Committees are trained to carry out such sensitisation programmes. The Environmental Health Unit at the District Water and Sanitation Team also support the sensitisation of the communities"*.

5.1.8 Frequency of educational programmes on water resource management in communities

For those who indicated that they received education concerning the protection and use of water, further enquiry was made as to how often they got such education. About 50% of the rural respondents and 74% of the respondents in urban areas indicated they received some form of education within the last 1 to 3 yrs. Some 32.2% of rural respondents indicated that they rarely had any education, likewise about 10% of the urban dwellers as indicated in Table 5.8.

Table 5.8 Frequency of education on water resource management

Setting		Frequency	Percent
Rural	1-3yrs	57	50.4
	Rarely	28	32.2
	No Response	2	2.3
	Total	87	100.0
Urban	1-3yrs	84	74.3
	3 to 5yrs	11	9.7
	Rarely	11	9.7
	No Response	4	3.5
	Total	113	100.0

Source: Field Survey, March to April, 2014

5.1.9 Last occurrence of education on water resource management

Examining when last such education and sensitisation programmes took place shows that the last occurrence was indicated to be between 2010 and 2013 for rural (65.6%) respondents and about 97% of the urban respondents indicated same (See Table 5.9)

Table 5.9 Last time education was carried out

Setting		Frequency	Percent
Rural	2002 -2005	29	33.3
	2010 – 2013	57	65.6
	No Response	1	1.1
	Total	87	100.0
Urban	2002 -2005	20	23.0
	2010 – 2013	84	96.6
	2014	7	8.0
	No Response	2	2.3
	Total	113	100.0

Source: Field Survey, March to April 2014

It is evident from the above that, frequency of community education and sensitisation on water resources management and practices was low. Although the DWST focal person stated that education programmes were organised twice a year for communities, he

agreed that there was the need for intensification of public education to enhance community knowledge on water resources and their management.

5.1.10 Duration for the community education on water resource management

About 37% of the rural respondents received education within a day whiles about 33% of the urban respondent indicated their last education on water issues occurred within 2 to 3 days. Comparatively education lasted longer in urban communities than rural communities as shown in Table 5.10.

Table 5.10: Duration of community education and sensitization programmes

Setting		Frequency	Percent
Rural	Within a day	31	35.6
	2 or 3 days	25	28.7
	3 days and above	24	27.6
	No Response	7	8.0
	Total	87	100.0
Urban	Within a day	33	29.2
	2 or 3 days	37	32.7
	3 days and above	42	37.2
	No Response	1	0.9
	Total	113	100.0

Source: Field Survey, March to April 2014

5.1.11 Organisation in charge of the last education on water resource management

It is noted on table 5.11 that NGOs are the main providers of education and sensitization for both rural (63.2%) and the urban (48.7) respondents. However, percentage wise, most rural respondents had their education from NGOs than that of urban respondents. Community education was next most important for both rural and urban respondents. For

education coming from a governmental organization, urban respondents had more than rural respondents with 12.4% and 8% respectively.

Table 5.11: Organisation in charge of the last education on water resource management

Setting		Frequency	Percent
Rural	Community	24	27.6
	NGO	55	63.2
	Government	7	8.0
	No idea	1	1.1
	Total	87	100.0
Urban	Community	43	38.1
	NGO	55	48.7
	Government	14	12.4
	No idea	1	0.9
	Total	113	100.0

Source: Field Survey March to April 2014

5.1.12 Nature of the education

Effectiveness of education depends a lot on the nature or how that education is delivered. Majority indicated that house to house education was the nature of the education they received represented by 51.7% for rural respondents and 61.9% urban respondents. **(See Table 5.12).**

5.1.13 Perception of effectiveness of education

How effective the education was could best be judged by those educated. For rural respondents 74.7% indicated that community education and sensitization programmes were very effective while 38.1% of urban respondents indicated same. **(See Table 5.13).**

Table 5.12: Nature of the education

Setting		Frequency	Percent
Rural	House to House	45	51.7
	The whole community	28	32.2
	School	8	9.2
	Market place	3	3.4
	No Answer/ Blank	3	3.4
	Total	87	100.0
Urban	House to House	70	61.9
	The whole community	27	23.9
	Market place	12	10.6
	No Answer/ Blank	4	3.5
	Total	113	100.0

Source: Field Survey, March to April 2014.

Table 5.13: Residents Perceptions on Education

Setting		Frequency	Percent
Rural	Less Effective	13	14.9
	Very Effective	65	74.7
	No Answer	9	10.3
	Total	87	100.0
Urban	Less Effective	14	12.4
	Effective	49	43.4
	Very Effective	43	38.1
	No Answer	7	6.2
	Total	113	100.0

Source: Field Survey, March to April, 2014

5.1.14 Suggestions on the involvement of community members in planning and implementation of water projects

Various suggestions were given on how community members could be involved in water projects to facilitate the improvement in the availability and safety of water. Some rural (35.63) respondents suggested that community education on the consequences of negative behaviour on water sources should be encouraged. About 46% of the urban respondents also suggested there should be public announcement of upcoming water projects to facilitate public awareness and participation **(See Table 5.14).**

Table 5.14: Various Suggestions for improvement for availability and safe water supply

Setting	Suggestions	Frequency	Percent
	Education of people on the consequences of their negative behaviour toward water	31	35.63
	Public awareness campaigns through public announcements of upcoming projects, water policies	20	22.98
	Community members must be personally involved	17	19.54
RURAL	Opinion leaders must be involved in such projects	19	21.85
Total		87	100
	Education of people on the consequences of their negative behaviour toward water	31	27.43
	Public awareness campaigns through public announcements of upcoming projects, water policies	52	46.04
	Community members must be personally involved	10	8.84
URBAN	Opinion leaders must be involved such projects	20	17.69
Total		113	100

Source: Field Survey, March to April 2014.

5.1.15 Community mobilization and initiatives in water resources management

In order to successfully manage water supply facilities and water resources in general and also to participate fully in planning and design, communities must be organised, and the

minority groups especially women and poorer people must be encouraged to participate fully (Mensah, 1999). Traditional authorities play very important roles in community level management of water resources. Chiefs are seen as the highest authority in most communities and they perform roles such as the "coordination of various aspects of everyday life, the realization of community dreams and aspirations, creation of harmony between people and their natural, spiritual, physical and economic environment" (Boyne, 2007). This section therefore sought to find out what traditional chiefs were doing in the communities as well as at the district level to ensure effective water resources management. In cases where the researcher could not interview the traditional head of a community, the assembly member was interviewed instead.

From the interviews, it was discovered that most heads of the sampled communities recognized the importance of water management and were therefore actively involved in community mobilization towards better management of water resources. The Gyasehene of Ekumfi Abor asserted that "*access to water and the wellbeing of our water is very important to me and I am even the chairman of the WATSAN committee which sees to water and sanitation related issues in this community. There has not been much progress because of the low support we get from the government"*. He however enumerated the challenges they faced in relation to water as that *"a. the drains that are supposed to supply water to our four streams when it rains have all disappeared because of road construction. b. dry seasons are hardest times to get access to water because ponds dry out and c. we don't have pipe borne water in this community*". With regards to some of the activities he had organised as a chief to enhance better access to and the management of water bodies, he highlighted that "*I occasionally organize community members to*

desilt water bodies and also do clean up exercises to remove rubbish from drains through communal labour. I also sometimes hire an excavator to do the desilting". These activities, he noted, had been very effective.

Similarly, in an interview with the assembly man of Ekumfi Ebiram, he noted that amongst some of the activities he had undertaken as the assembly man was continuously writing letters to the assembly on issues of water concerning the community especially on the quality of pipe-borne water. With regards to community participation at the district level, he added that *"I normally organise meetings where heads of sections of the community partake in such meetings to discuss water related issues and I carry their concerns to the district assembly so my voice is always heard as the community representative at the assembly I normally participate in CWSA, DA and NGO meetings on water".* Although interviews with most heads of communities revealed some level of community participation and representations at the district level, the WATSAN committee head of Ekumfi Swedru complained that

"there was an instance when we got a letter to attend a meeting at the district assembly to discuss water issues in the district. The letter specifically requested the presence of two representatives thus, the Queen who is the traditional head of this community and I, but because the queen was absent at that time, I went with another WATSAN committee member. We got to the venue of the meeting and we were treated badly because apparently, according to them, the letter stated only one representative but I clearly remember that the letter asked for two representatives from every community. They treated us badly and even gave us food meant for one person to share. They act as if

some of us do not matter. How can there be effective participation if they treat representatives like how we were treated that day?" (Mr. Opoku, Ekumfi Swedru).

It was further revealed from the interviews that NGOs rather work effectively with community heads than with other water related sectors especially the DWST. Examples of such NGOs and institutions which work or had worked effectively with chiefs in the district include Global Brigade and Blue Sky Company Limited. In assessing cases where chiefs/assembly representatives had organised meetings with some community members concerning water and the basis of selection of such members, the study found out that in most cases, chiefs selected heads of families as well as some women to participate in such meetings.

But in most cases, as in the case of Ekumfi Techiman, Assafa and Abor, chiefs normally organised meetings with all community members present especially during festivals. During such times, money obtained from sale of water from ground water with mechanized pumps were accounted for to the public and various developmental projects that had been financed from such sources were also announced as in the case of Ekumfi Abor.

These findings are in agreement with Boyne (2007) that in areas where traditional authorities have over the years been able to establish and maintain organizational structures, they are better able to enforce mutually agreed rules on the use of natural resources. This study supports his argument that traditional authorities are in a better position to develop effective management systems when they are adequately and efficiently given the necessary support and resources.

5.2 Community knowledge of regulation and laws governing water resources

This section examines the existing laws and regulations put in place to check practices which have adverse effects on water resources and the environment as a whole. The laws that guide the management of water resources in Ghana are the Water Resource Commission Act No. 522 of 1996 and the Water Use Regulation, Legislative Instrument (L1 1692 of 2001) (Dei 2011). Also the water use permit is seen as a very essential tool in regulation of water abstraction and protection of water bodies in Ghana. District assemblies have also established bye-laws to check activities of communities on water resources. Also, this section looked into various indigenous beliefs and practices attributed to water resources management in the district as against the legislative laws established by the government. In the light of the above, the study performed the following tasks:

- ascertain community knowledge on both negative and positive activities that affect water resources
- assessed community awareness on regulations or laws (traditional or legislative) that are meant to protect water bodies and use in their communities
- documented their level of compliance to these laws or regulations
- examined their awareness on sanctions for disobedience of these laws

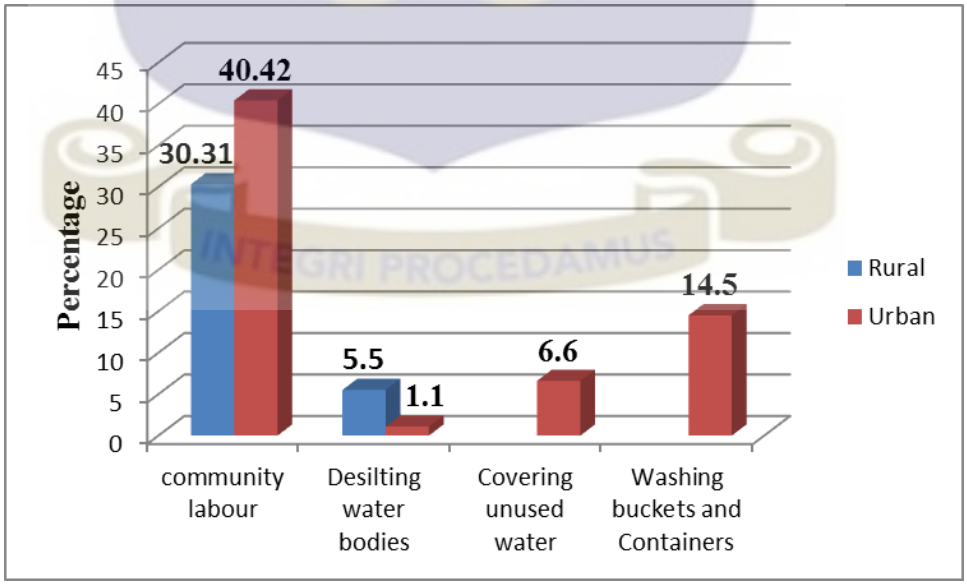
Participants for this section included community members, chiefs, DWST and the District Assembly.

Both quantitative and qualitative data collection procedures and analytical tools were used to arrive at the following findings.

5.2.1 Perception of respondents on positive activities that affect water sources

Activities that affect water sources could either be negative or positive. Respondents were in effect asked to give multiple responses in their views as to what were the various positive activities that affected their water sources. For the Rural communities, Communal labour to clear around water sources (31%) and desilting of water bodies (5%) were mostly noted by respondents as the positive activities that affect water bodies. For urban respondents also, majority indicated that communal labour to clear around source (42%) of water is the main positive activity that was undertaken. Some 15% urban respondents also indicated that washing of buckets before dipping them into water was also another positive activity which enhances the protection of water bodies from filth. They also indicated that covering water when not in use was another positive water management activity (**See Figure 4.3).**

Figure 5.1: Positive activities that affect water sources

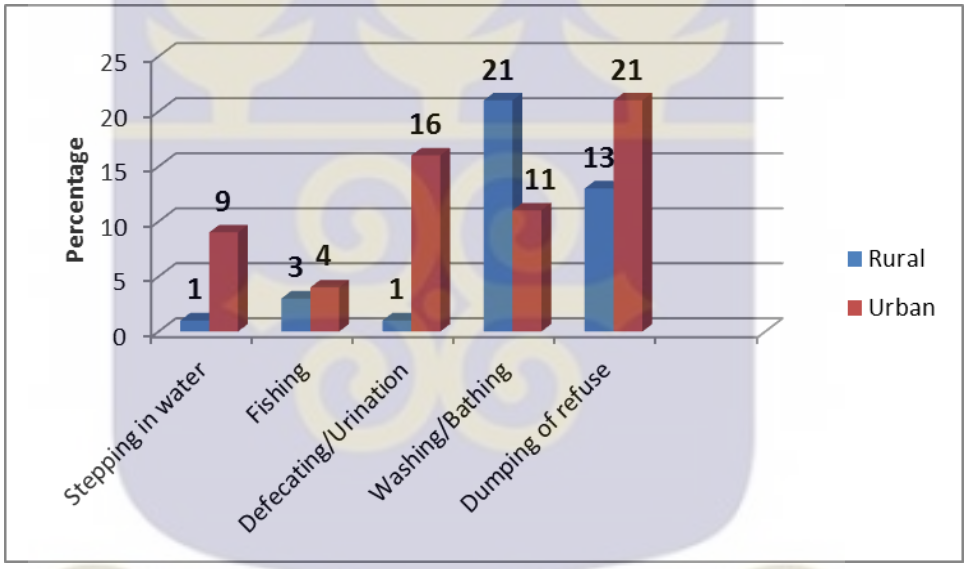


Source: Field Survey, March to April 2014

5.2.2 Negative activities that affect water resources

In examining negative activities that affect water sources, respondents mentioned various activities that they thought affected water resources. Rural respondents, in particular, with a percentage of 21 indicated washing or bathing in water bodies to be the activity that most affect water resources. Whiles 21% 0f urban respondents indicated dumping of refuse in water bodies (**See Figure 4.4**).

Figure 5.2: Perceptions on Negative Practices Affecting Water Sources



Source: Field Survey, March to April 2014

The data above indicates that respondents have some level of knowledge of water resources management laws and regulations.

5.2.3 Awareness of regulations meant to protect water bodies

Public awareness on laws and regulations governing water is an essential tool in the battle against negative activities that affect water bodies/sources. There was therefore the need to examine respondents on their knowledge of these regulations. Majority of respondents from both rural and urban areas indicated that they were aware of some regulations.

However, more in terms of percentages of the rural respondents agreed than those at the urban centres. Some 2.7% of the urban respondents indicated that, they had less or no knowledge at all of regulations. Likewise, very few (2.3%) of the rural respondents indicated same **(See Table 5.15).**

Table 5.15 Awareness on regulations/laws for water protection in communities

Setting		Frequency	Percentage
Rural	Yes	85	97.7
	No	2	2.3
	Total	87	100.0
Urban	Yes	110	97.3
	No	3	2.7
	Total	113	100.0

Source: Field Survey, March to April 2014.

5.2.4 Kind of Regulations

The kind of regulations that exist in a community can also be a vital instrument for planners in the design of appropriate management mechanisms. This section therefore delved into perceptions of respondents on the kind of regulations that they were aware of concerning water resources. The findings indicated that majority of the respondents from rural and urban respondents indicated that they were aware of traditional/customary regulations with 92.0% representing rural and 88.5% for urban. For rural respondents only 5.7% represented those aware of legislative regulations whiles 8.8% represented urban respondents. The rural respondents were more aware of traditional regulations than the urban respondents. However, the urban respondents knew more of legislative regulations than the rural respondents. See Table 5.16

Table 5.16: Respondents awareness on types of regulation (Traditional/customary)

Setting		Frequency	Percept
Rural	Traditional/Customary	80	92.0
	Legislative	5	5.7
	No Answer/ Blank	2	2.3
	Total	87	100.0
Urban	Traditional/Customary	100	88.5
	Legislative	10	8.8
	No Answer/ Blank	3	2.7
	Total	113	100.0

Source: Field Survey, March to April 2014

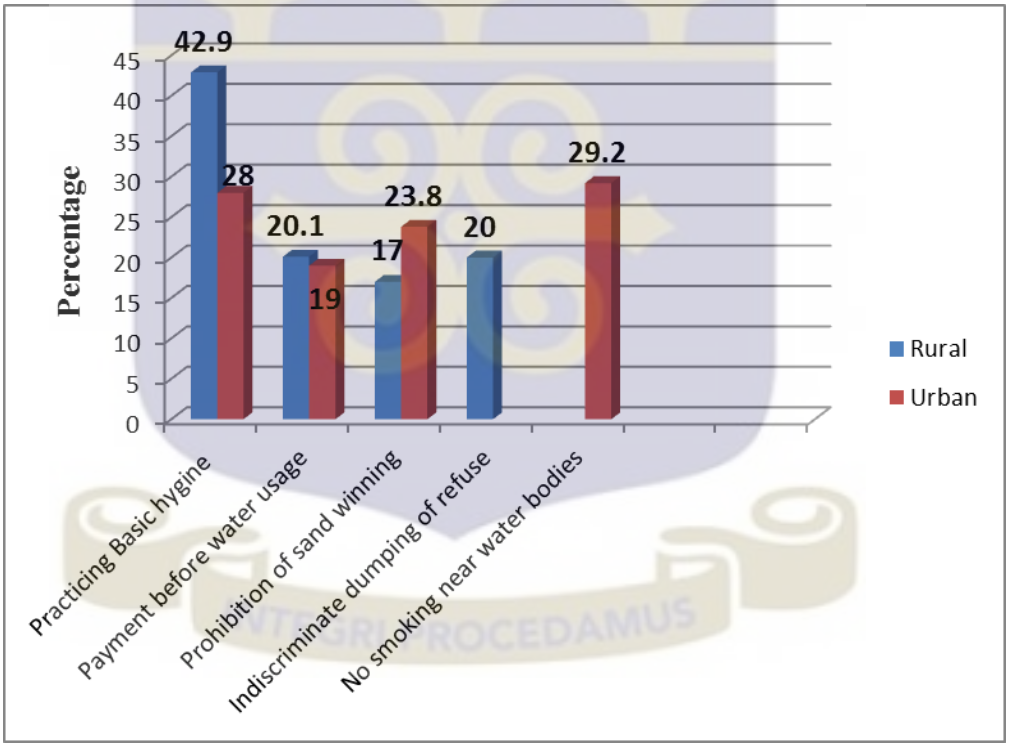
5.2.5 Traditional regulations

Various indigenous beliefs and practices have guided indigenous natural resources management (Boyne, 2007). As indicated earlier customary laws and practices have existed in Ghana for a long time and covered areas of water conservation, catchment protection, pollution control and protection of fisheries (Odame-Ababio, 2005). These constituted management practices expressed through religious beliefs, moral sanctions as well as other sacred and cultural practices (Boyne, 2007). Traditional regulations have stood the test of time through regulations put in place by traditional authorities which includes taboo days where no one was allowed to visit the source of water and totems etc. From the survey, 74.7% of rural and 73.9% of urban respondents indicated observance of taboo days as the main regulation governing water bodies especially rivers and streams. About 9% of urban respondents indicated that women in their menstrual period and lactating mothers were not allowed to visit water bodies. Also 10.1% of rural respondents indicated the removal of foot wear before stepping into streams to fetch water. Others also noted other regulations such as tree planting (1% of rural respondents) around rivers and streams and the prohibition of washing in water bodies (0.8% 0f urban respondents).

5.2.6 Respondents perceived knowledge on legislative regulations

The study also looked into the perceived knowledge of respondents on Legislative regulations on water resources. From the analysis, 42.9% of rural respondents noted practicing of basic hygiene around water sources as a legislative regulation. Again 29.2% of urban respondents also indicated prohibition of smoking around water bodies as a legislative regulation. Practice of basic hygiene and payment before fetching water were also indicated legislative requirements. Figure 5.3 below shows the details.

Figure 5.3 Perceived legislative regulations



Source: Field Survey March to April 2014

The DWST and the district assembly perceived that community members had little or no knowledge of legislative regulation of water resources even though they claimed they had

been organizing community sensitization activities on this issue. Comparing traditional and legislative laws awareness in the district, it can be concluded that knowledge on traditional or customary regulation far outweigh knowledge of legislative regulations on water. These do not support the argument of Boyne (2007) that natural resources management is largely concentrated in the hands of the state.

5.2.6 Compliance of laws/regulations governing water resources

The existence of regulations does not guarantee the proper management of water resource. There was therefore the need to inquire further into the compliance of these laws and regulations. Both rural (97.1%) and urban (96.5%) respondents obeyed regulations on water resources **(See Table 5.17)**

Table 5.17: Compliance of laws/regulations governing water resource

Setting		Frequency	Percent
Rural	Yes	85	97.1
	No	1	1.4
	No Answer	1	1.4
	Total	87	100.0
Urban	Yes	109	96.5
	No	2	1.8
	No Answer	2	1.8
	Total	113	100.0

Source: Field Survey, March to April 2014.

However, the researcher observed that even though respondents stated that they obeyed these laws and regulations, some practices along water banks indicated otherwise. For example, the researcher noted some disturbing practices which had adverse effects of water bodies being practiced by communities. Such observations can be seen in figures 5.8, 5.9 and 5.10, where some communities along the Ochi Narkwa wash, bath and sand

win along this river. It was observed that law enforcement by the DWST and the District Assembly was low. It was surprising to see a car washing bay right on the bank of the Ochi Narkwa (which drains into the sea at Narkwa) at Essarkyir where the office of the Ekumfi District Assembly is located. On the bank of the Ochi Amisa (which drains into the sea at Amisano) close to Mankessim was a car fitting shop where dirty oil from spoilt cars were washed into the Ochi Amisa whenever it rains.

5.2.7 Reason for Adhering to laws

With reference to Table 5.18, majority of rural and urban respondents reported to obey regulations because of fear of river gods and this was represented by 24.1% and 26.5% for rural and urban respondents respectively. Preservation of culture was also indicated as a reason for obedience among other factors which can be seen in Table 5.18.

Table 5.18: Reasons for obeying laws/regulations

Setting		Frequency	Percent
Rural	Preserve Culture	52	59.8
	Fear of river gods	21	24.1
	Avoid Punishment	14	16.1
	Total	87	100.0
Urban	Preserve Culture	50	44.2
	Fear of river gods	30	26.5
	Protect Source	8	7.1
	Avoid Punishment	25	22.1
	Total	113	100.0

Source: Field Survey March to April, 2014.

A follow up through interview of traditional heads revealed that in most of the communities, traditional laws are adhered to, the level of obedience to these laws had

dwindled over the years as observed from this statement "*Some years ago community members dared not disobey laws/regulations that governed our water bodies but today, people are disrespectful especially the young ones. Elders are also too busy to reprimand and teach the young ones what is right and wrong with respect to our water bodies. Also the advent of Christianity is a factor in that people now disregard gods totally and because of that some of our gods have left us to settle elsewhere"* (Nana Gyasehene, Ekumfi Abor). Focus group discussions also revealed that taboo days are effectively adhered to, other laws such as the prohibition of the use of dirty bucket in water bodies, not stepping in water with sandals, no washing and bathing are all not effectively obeyed. It was also observed that people had built houses and established farms around water bodies. This is in agreement with Dei (2011) that traditional laws and regulationsgoverning water bodies have lost their potency in recent times.

5.2.8 Awareness of various sanctions for disobedience

Through time, traditional institutions have played important roles in making sure that breakers of natural resources management rules were punished (Boyne, 2007) in that laws were and still are enforced through various sanctions usually imposed by fetish priests and priestesses (Odame-Ababio, 2005). Analysis of this issue as displayed in Table 5.19 below revealed that majority of rural (87.4%) and urban (79.6%) respondents were aware of some sanctions or disobedience of laws governing any water resource (See Table 5.19)

Table 5.19 Awareness of sanctions for disobedience

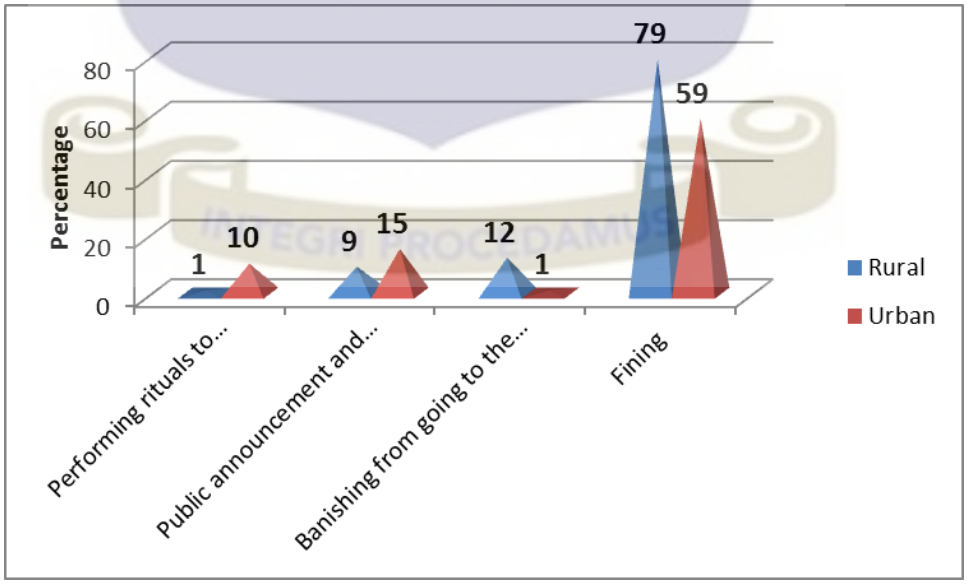
Setting		Frequency	Percent
Rural	Yes	76	87.4
	No	11	12.6
	Total	87	100.0
Urban	Yes	90	79.6
	No	23	20.4
	Total	113	100.0

Source: Field Survey, March to April 2014

5.2.9 Traditional sanctions

Knowledge on traditional sanctions for disobedience as depicted in Figure 5.5, shows that majority of respondents for both rural and urban were aware of some sanctions for disobedience. Some listed being fined with a representation of 59% and 79% for rural and urban respectively. Moreover, some rural (15%) respondents also indicated public announcement and disgrace as a sanction for non-compliance or disobedience.

Figure 5.4: Traditional Sanctions for Rural

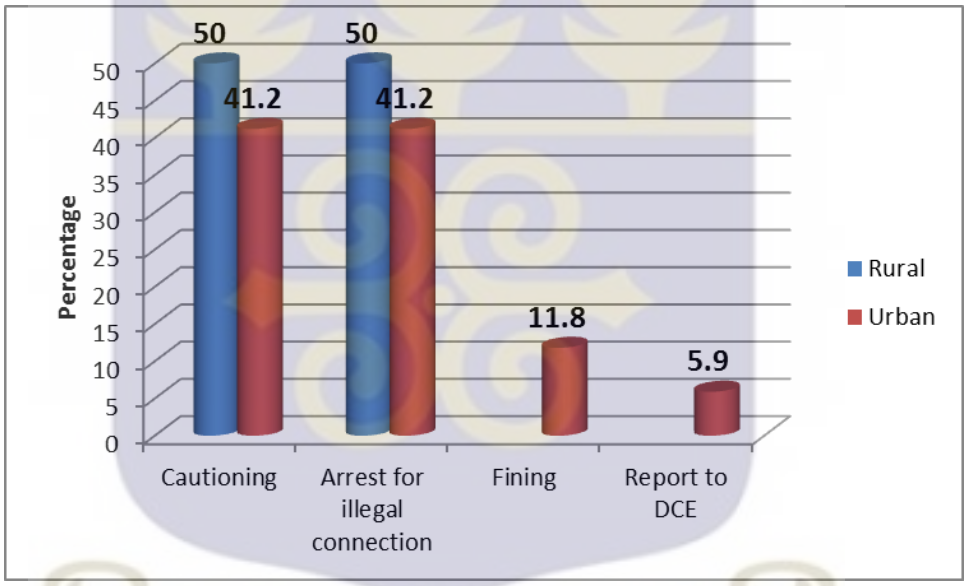


Source: Field Survey March to April 2014.

5.2.10 Legislative sanctions

For legislative sanctions, 50% of rural respondents indicated that cautioning and being arrested for illegal pipe-borne water connection were the legislative sanctions they are aware of. Some urban respondents with a representation of 41.2% mentioned cautioning and being fined to pay a certain amount of money. Also, 11.8% of urban respondents indicated arrest for illegal pipe-borne water connection **(See Table 5.5).**

Figure 5.5 Legislative Sanctions



Source: Field Survey, March to April 2014

Plate 5.1: Refuse dump on the bank of the Ochi Narkwa

Source: Field Survey, March 2014

Plate 5.2 Sand wining, washing and bathing in the Ochi Narkwa

Source: Field Survey, March 2014

5.3 Summary:

The findings indicated that there was some level of community participation or involvement of community members in the implementation of water projects and other water related programmes. With the individual involvement level, however, it was revealed that males dominated in water resources management issues and decisions in the district although it was observed that women were the caretakers of water facilities especially those where community members had to pay before usage like mechanized boreholes and pipe-borne water system. This is in support of Boyne (2007) who identifies that males dominated in the management of natural resources in general especially in developing countries.

In addition, the results revealed that NGOs were rather involved with community members in community education and sensitisation as well as other water projects than DWST and other water related sectors. This was indicated by 63.2% of rural respondents and 48.7% of urban respondents in terms of community education and sensitisation. Again, this agrees with Boyne (2007), that NGOs are more involved with traditional institutions in the management of natural resources especially in the area of water resources management than governmental organizations.

The study also revealed that traditional heads of communities recognised the importance of water to the wellbeing of their community members and were actively involved in water related issues in their communities even though progress had been slow because of the low government support. Boyne (2007) recognizes that there has been a shift in the role of chiefs and elders from the simple management of sacred groves, sacred trees and lands etc. to a more prominent role of the management of natural resources especially in

the areas of water resources in Ghana. He attributed this to the changing trends in development where *"the increasing need for portable water and the management of rivers and streams for enhanced livelihoods through irrigation projects is seen as central to the wellbeing of their people*"(Boyne, 2007:98), hence, chiefs and other community leaders have now assumed the management of water resources through the support of district assemblies (Boyne, 2007).

This chapter also highlighted the existing laws and regulations, their effectiveness and the adherence level of community members of them. The findings indicate that respondents were aware to some extent of the activities that affected water resources both negatively and positively although they still undertake these activities. It was also obvious from the findings that respondents had a fair amount of knowledge on laws and regulations concerning water resources. However, respondents were quite knowledgeable about traditional laws than legislative laws on water resources. Finally, despite the fact that many of the respondents stated that they obeyed laws and regulations on water resources, it was observed by the researcher that certain practices along river bodies in the district indicated otherwise.

The next chapter focuses on the summary, conclusion as well as suggested recommendations.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATION

6.0 Introduction:

Water resources management has become increasingly important in recent times due to higher rate of urbanization and population growth, reckless socio-economic activities as well as the advent of climate change and variability (Biswas, 2004). Proper management of water through a multi sectoral approach where different sectors can pull together resources to solve the complex water resources issues that the world is facing has been argued as one of the surest ways to ensure the survival of humans as well as ecosystems (UNESCO, 2009; Essaw, 2007; WRC, 2007; Jonch-Clausen, 2004). This chapter presents summary of findings, conclusions made from the findings and policy recommendations for better water resources management in the Ekumfi District.

6.1 Major findings

This study sought to analyse water resources management in Ekumfi District of the Central Region of Ghana. Water resources management challenges in the district include small capacity of water treatment plant, obsolete pipelines and equipment, low quantity of pipe-borne water, dying water bodies, pollution and deforestation especially around water bodies among other challenges. The study therefore critically analysed the role of the CWSA (DWST) as the statutory public agency in charge of water resources management in the district by assessing their capacity level in the provision of sustainable water service delivery to the study area; the level of coordination between the DWST and other water related sectors; level of community participation in water

resources management and laws that have been established to protect and conserve water resources.

6.1.1 Institutional capacity of the DWST in the supply of safe and reliable water in the study area

The study sought to investigate the capacity of the CWSA (DWST since this work was conducted at the district level) by looking into water supply and the opportunities as well as the challenges of CWSA as the statutory institution in charge of water in the district. From the findings, potable water supply was very low especially in the rural areas in the district and these communities had to rely on unwholesome sources of water for their daily activities and survival in general.

It was also revealed that even though the DWST had put in place certain mechanisms to ensure effective monitoring, gathering and dissemination of information of data on water resources, the institution fell short in raising enough funds and also the ability to put in place proper mechanisms for rehabilitation and upgrading of reservoirs, pipes and other water resources.

6.1.2 Coordination between the DWST and other water related sectors

Coordination is seen by Saravanan et al. (2009) as the process where different actors supply a pool of wide knowledge base in the designing and implementation of policies and strategies in a consensus manner. As an approach to better manage water resources, the CWSA must coordinate with District Assemblies, Ministries of Environment, Health etc., as well as private sectors and NGOs involved in the provision of rural water, sanitation and hygiene education. This study examined the extent of coordination

between the CWSA (DWST since the study was done at the district level) and other water related agencies in the execution of water resources management strategies and projects. The study revealed that the CWSA recognizes the importance of coordination and collaborations due to the complex nature of water resources management and therefore works in close coordination with water related sectors especially the district assembly. However, it was observed that even though there was a strong coordination between the DWST and the District Assembly coordination and collaboration between the DWST and other water related sectors was low. These findings are similar to Dei (2011) in his study of water resources management for socio-economic development in the Pru and Atebubu-Amanten Districts of Ghana. His study revealed similar deficiencies in the level of coordination between water related sectors, in that collaborations and coordination that exist among water related institutions are usually identified to be very weak between and within such institutions (Dei, 2011).

6.1.3 Community involvement in the implementation of water projects and management of water resources as a whole

The findings indicated that there was some level of community participation or involvement of community members in the implementation of water projects and other water related programmes. With the individual involvement level however, it was revealed that males dominate in water resources management issues and decisions in the district, although it was observed by the researcher that women were the caretakers of water facilities especially where community members had to pay before usage (areas that have mechanized boreholes and pipe-borne water system). This supports Boyne (2007)

who identifies that males dominate in the management of natural resources in general especially in developing countries.

The findings also revealed that NGOs were rather involved with community members in community education and sensitisation as well as other water projects than DWST and other water related sectors. This was indicated by 63.2% as against 8.0% in favour of NGOs for rural respondents and 48.7% as against 12.4% in favour of NGOs for urban respondents in terms of community education and sensitisation. Again this agrees with Boyne (2007), that NGOs are more involved with traditional institutions in the management of natural resources especially in the area of water resources management than governmental organizations.

The survey also revealed that, traditional heads of communities recognised the importance of water to the wellbeing of their community members, and were actively involved in water related issues in their communities even though progress had been slow because of the low government support. Boyne (2007) recognises that there has been a shift in the role of chiefs and elders from the simple management of sacred groves, sacred trees and lands etc. to a more prominent role of the management of natural resources especially in the areas of water resources in Ghana. He attributed this to the changing trends in development where *"the increasing need for portable water and the management of rivers and streams for enhanced livelihoods through irrigation projects is seen as central to the wellbeing of their people*" hence, chiefs and other community leaders have now assumed the management of water resources through the support of District Assemblies (Boyne, 2007; 78).

6.1.4 Existing laws and regulations put in place to check practices which have adverse effect on water resources and the environment as a whole.

Establishing laws and regulations on water use helps maintain the health of water bodies as they are protected from pollution and contamination. Laws governing water resources use and protection in the Ekumfi district cover both customary (traditional) and legislative (formal) laws. The findings indicated that respondents were aware to some extent activities that affected water resources both negatively and positively. They however still undertook the negative activities knowing fully the extent of damage these activities could cause to their water bodies and their general well being. This was based on the fact that, despite many of the respondents stated that they obeyed laws and regulations on water resources, it was observed by the researcher that certain practices along river bodies in the district indicated otherwise. It was also identified from the findings that respondents had a fair amount of knowledge on laws and regulations concerning water resources. However, respondents were well knowledgeable in traditional laws than legislative laws on water resources.

6.2 Contribution of findings to knowledge

The need to ensure the sustainable management of water resources has been established throughout this thesis. This thesis highlighted an acceptance of a now common philosophy: an integrated approach which encompasses the promotion of a holistic approach- in which the relationships between the economic, social and environmental systems are effectively addressed. In reviewing literature, it was acknowledged that very little was offered in terms of water resources management at the local level based on the

relationship between the laid down water policies in Ghana and practices on the ground in terms of implementation and feasibility.

The depth of responses shared by respondents propelled water resources management in the district towards a direction for more sustainable practices in relation to water challenges. The processes of this research provided broader contextual issue and the interrelationships between the different dimensions and levels of capacity.

In addition, this research makes a theoretical, conceptual and methodological contribution through the processes used. Most researches on water resources management have often concentrated on the national level water resources management especially major river basins and access to drinking water by the highly disadvantaged people especially in urban areas. These researches have often rarely adopted theories and methodologies that concentrated on international policies, the role of international organizations, governments and non-governmental in water resources management. This research therefore moved away from the norm by systematically analysing the interconnections and interrelations between stakeholders. This study breaks new ground by merging a theoretical and a conceptual framework that steered the entire enquiry process towards a more on-the-ground and a more in-touch level of inter-stakeholder coordination and cooperation in water resources management. This was looked at in relation to the laid down policies on water resources management in Ghana. Also the choice of methodology for the data collection and analysis of water resources management in a country-specific context serves as a major contribution to knowledge worth acknowledging.

6.3 Utility of conceptual framework used as well as the theoretical underpinning of this thesis in light of the findings

The framework consisted of structures constructed and placed in a societal frame with the goals of economic efficiency, social equity and sustainability of ecosystems. These structures were centred around i: an enabling environment of appropriate policies, structures and legislation for sustainable water resources development and management ii: an established institutional framework through which policies, strategies and legislations are implemented iii: a set up management instruments (Jonch-Clausen, 2004). These conditions or entities influence one another with clear and distinct interconnections between them. The framework was an adaptation of Jonch-Clausen's (2004) take on sustainable and integrated water resources management with some linkages and extensions developed by the researcher. The framework was used to analyse the different management practices between the rural and urban areas as well as inter stakeholder differences in the Ekumfi District. The modelling of the three structures or pillars of water resources management was commenced by listing the practical variables that provided linkages underpinning the three pillars. The variables were grouped under three headings (pillars) amounting to a total of eleven variables (refer to fig 3.2). This was succeeded by the establishment of a link matrix which provided the opportunity for determining the connections between the variables. The utility of the framework therefore spanned around mirroring the variables in the framework against policies and their implementations on the ground. Variables and the link matrix were useful in expressing their outcomes. The framework was also useful in that it operated with two expected sequences of events; strong rural and urban development; as well as national

development. The variables were therefore determined to trigger or stimulate the views of rural and urban people of the Ekumfi District. The confidence levels in each case of data collection revealed the actual probability of the changes envisaged by the Ghana water policy which has strong links with the conceptual framework as actually happening on the ground. The framework therefore constructed a pathway that led to the revelation of the direction of change as well as the confidence level of both rural, urban and national expected sequence of events in a mutual concession level of sense in that matter. Ergo, the expected sequence of events was not an absolute view but rather a mutual concession. The level of change or implementation was chosen by comparing what was on the ground to what was on paper (Ghana water policy), whiles confidence level revealed the degree of certitude that such changes had actually taken place. So in the nutshell, the conceptual framework aided in ascertaining the situation on the ground as far as water resources management was concerned.

More importantly, the three pillars approach in the framework presented in this thesis and used for analyses was very useful in that it allowed for careful and systematic considerations of water resources management practices. The framework was also very useful in the revelation of gaps between policy and practice in that it served as a sort of check-list on accepted water resources management practical applications.

However the short comings of the framework become obvious as some of the components under the three major pillars seemed out of place. There was also the situation of inadequate information on management instrument for example, which made the linkages quite difficult to analyse. The framework also did not allow much flexibility

in terms of linkages between policies on water resources and traditional systems of water resources management.

Herbamas' communicative rationality theory which was the theoretical underpinning of this thesis has been widely acclaimed to embody a sort of laid down picture of how integration can best be achieved, although some critics have argued that integration cannot be achieved in Herbamas' normative sense of view. This theory posits that to foster communicative rationality among actors, there must be a change in existing institutional structures to policy environment to 'facilitate an open, discursive style of government among actors (Saravanan et al., 2007; 77). This study therefore recognised Herbamas' view on seeing all section of the society as stakeholders and also their strategic roles as actors and agents in the decision making process in water resources management. The theory therefore aided in the entire process of this thesis by highlighting the importance of analysing integration of institutions. It also aided in highlighting the importance of the involvement of multiple stakeholders in water resources management.

6.4 Implications of findings to policies

The national water policy as indicated earlier was approved by the Cabinet on June 21st 2007 and launched formally in February, 2008. This policy provides a framework for a more sustainable development of water resources in Ghana (Darteh et al., 2010, MWRWH, 2007), with the basic aim to "*promote an efficient and effective management system and environmentally sound development of all water resources in Ghana*".

This policy targets all levels of water users, water managers and practitioners, investors and policy makers centred within the central governmental and decentralised structures, Non-Governmental Organisations and International Agencies (Darteh, et al., 2010). Most importantly, this policy advocates clear cut cross-sectoral issues related to water-use and their linkages to other important sector policies such as policies on sanitation, agriculture, health, energy etc. This takes a critical look at implications of findings to policy. According to the National Water Policy (2007), on it's take on community water and sanitation "*Ghana's long term plans outlined in Ghana Poverty Reduction Strategy (GPRS) and other related development priorities, give focus to improved rural supply, sanitation, health and, the control and eradication of water-borne diseases. A significant achievement of the last decade is the development of the appropriate institutional structure to implement the NCWSP. CWSA is now firmly established in all ten regions of the country and continues to facilitate and provide support to District Assemblies in executing water and sanitation facilities including project planning and procurement*". Under this policy, there are several policy measures and actions indicated at enhancing the capacity of the CWSA.

The issue of inadequate funding, inadequate water supply, ineffective mechanism for rehabilitations and effective monitoring hamper effective water service delivery in the district although it has been clearly stated in the policy that government *"will support District Assemblies to develop and contribute to financing District Water and Sanitation Plans (DWSPs) as a key requirement for participating in the NCWSP. Build capacity at the community level for the provision of water and sanitation services to support DAs in the monitoring and supervision of water and sanitation services and ; promote the*

establishment of relevant institutions at regional and district level for drinking and raw water quality" (MWRWH, 2007; 40).This is not to say that, situations are very bad with respect to the capacity of the CWSA as it can clearly be seen from earlier analysis that there has been certain improvement over the years. Uncertainties in this area are undoubtedly creating problems for water service delivery in the district. This again is an indication of policy implementation gaps and challenges which need to be addressed effectively.

Integration and harmonisation of the activities of water related sectors has been a major challenge to the implementation of water sector reforms which were initiated in the mid-1990s (Darteh et al., 2010), which is why the national water policy strongly recognises the relevance of effective interface among key stakeholder institutions. Normally, efforts to have Sector Wide Approach (SWAP) are mainly targeted at interrelations in rural water supply under the Community Water and Sanitation Programme. From earlier discussions findings revealed a low level or coordination and integration within and between stakeholders in the district which implies situations are somehow like in the 1990s despite the elaborations on how integration can and will be achieved in the current water policy. The lack of a firm grip on coordination of policies and strategies in the District in water delivery and services is affecting water resources management greatly in the district. As already indicated, there are several institutions involved in the delivery of water in the District. It is very important that there be an effective coordination of activities of these institutions. District authorities have the responsibility for providing the infrastructure for the delivery of water. Public health authorities have a role to play in ensuring a wholesome water supply for human consumption. There is also the need for

adequate coordination on land policy that will control housing development, farming and other activities that may eventually have effect on water bodies and water supply to homes in the district. The disjoint between the water policy and its implementations in the district with respect to coordination is very worrying.

Furthermore, the policy also ensure sustainability by making provision for *"effective community ownership and management of facilities, active participation of women, public sector facilitation and private sector provision of goods and services"* (MWRWH, 2007; 44). It was clear from earlier discussions that males dominate in water resources management issues and decision makings although there was some level of women empowerment in the district in the sense that women were mostly in charge of collecting money from community members who fetched water from mechanized boreholes and stand pipes as well as community tanks as in the cases of Ekumfi Abor, Narkwa, Ebiram etc. So this case of the growth in the involvement of women to some level in water resources management in the district was a little bit far from the status quo where men largely dominate in the management of natural resources in general.

Private sector participation (NGOs in this case) was seen to be very high in this district which is a good indicator of a multi stakeholder involvement in water resources management as heavily advocated by policies. This is encouraging because water resources management is far too complex to be handled by a single organisation. The involvement of NGOs in the district therefore gives a sense of a wider coverage of water resources provision and management issues and issues pertaining to hygiene education and sensitisation.

Although, policies on water resources management over the years have given less recognition to the importance of traditional authorities in the management and decision makings in water resources, there has been some amendment in recent years where traditional rulers have been given some opportunities in the decision making processes in planning, implementation and evaluation of water projects and so on. Some researchers such as Boyne, (2007) have demonstrated that traditional authorities have been able to establish and maintain organisational structures and have often ensured the enforcement of mutually agreed rules on the use of national resources. Policies should therefore ensure that traditional authorities are given support and necessary resources to develop and promote their water resources.

Conservation and protection of water bodies form the basis of the Ghana Water Policy. Therefore, laws and regulations governing water resource are common in every part of Ghana. Laws and regulations governing water resources in the Ekumfi District cover both customary and legislative laws. Respondents were however more knowledgeable in traditional laws than in legislative laws which are normally drafted and educated by the district assembly and the DWST. This imbalance is an indication that local communities tend to associate more with local traditional laws and regulations than formal laws. Policies should therefore pay more emphasis on customary systems especially in the cases of rural and small towns.

6.5 Conclusion:

The study made a proposition that challenges of access to water and water resources management in the Ekumfi district are as a result of:

1. Low capacity of the CWSA
2. Poor inter agency coordination between the CWSA and other related agencies
3. Low community participation in decision making especially at the district level
4. Weak enforcement of laws on water

After data collection and analysis, the study still stands on the above preposition. However, these factors among other issues are not peculiar to the Ekumfi District alone. Many rural communities and small towns face similar problem in their water resources management. Institutions in charge of water resources management lack the capacity to implement their mandate established in policies on the ground hence although Ghana is well endowed with perennial and groundwater resources, about 45% lack access to potable water (Dei, 2011). Furthermore, threat to sustainable water service delivery in Ghana keep increasing and manifesting themselves each day, especially with the advent of climate change and variability. Among these factors also include rapidly dwindling water resources quality as a result of growing population, environmental degradation due to unsustainable exploitation of water and forest resources, perennial drying up of water resources due to drought as a result of changing rainfall pattern, high rate of evapo-transpiration etc. With the population of Ghana growing rapidly, better management of water resources is not a matter of choice anymore but a must. Often, carefully drawn water sector improvement policies are beautifully illustrated on paper, however, institutions have been observed to be practicing same old ones adopted along the lines of colonial masters (Bekoe, 2005). Better management of water resources will require enforcement and implementation of actual policies on the ground.

6.3 Recommendation

Drawing from the above findings and conclusions, the study makes the following recommendations:

Every institution in charge of water resources management should be well capacitated to ensure safe supply of potable water to people, conduct water resources demand assessments; disseminate information to stakeholders; put in place mechanisms to regulate water quality, service provision and land use; establish monitoring assessment techniques and establish financial incentive structures among others. This therefore require building strategies that will enhance the capacity level of institutions through adequate financing through greater budgetary allocations, periodic training programmes for personnel, knowledge building among sector practitioners, enhance effective private sector participation etc. Most importantly, water related sectors must be adequately monitored to ensure the implementation of sector plans and strategies.

An essential aspect of supporting the implementation of National Water Policy is ensuring effective inter-institutional coordination and collaborations (WRC, 2007). Unidentified institutional roles often lead to low coordination and collaborations as well as conflicts and duplication of effort. Identifying and defining the roles and responsibilities of the various water sectors responsible for policies, and making provisions for guidelines definitions for various water users and services, are seen as a means of dealing with fragmentation in the water sector. Also, private sector participation must be attracted and protected.

Undoubtedly, community participation is an essential component in any development agenda. Participation of local communities development activities meant for them has been argued as an essential component of successful and lasting development. This study therefore suggest that to ensure adequate and effective participation, water policies must be gender sensitive by paying particular attention to integrating women and gender sensitivity. Women who are the primary collectors of water must be encouraged to take active part in water resources management at all levels. Traditional authorities must as well, be encouraged to participate fully in water resources management both at the local level and the district level. To ensure active participation of local communities as a whole, there must be frequent and effective community education and sensitisation on water resources management issue especially issues concerning conservation and protection of water sources as well as issues on climate change and climate variability. This in turn will better inform community members about the changes to the hydrological cycle which deteriorate the availability of water for human populations in terms of quantity, quality and accessibility of water supplies. Situations of such nature often lead to increasing natural disasters and their impacts on water for human populations. Community sensitisation of issues of this nature will enhance their knowledge on activities which will enhance better defence against the impact of climate change effects.

The study established that communities are more aware of customary laws on water resources than legislative or formal laws. Although these customary laws have existed through time and have covered the areas of water conservation, pollution control and catchment protection etc. (Odame-Ababio, 2005), they are not enough to solve the complex issues of water resources. There is therefore the need for an integration of

traditional laws with well-established bye-laws for enhanced and effective water resources management.

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APPENDIX 1

QUESTIONNAIRE

DEPARTMENT OF GEOGRAPHY AND RESOURCE DEVELOPMENT

UNIVERSITY OF GHANA, LEGON

QUESTIONNAIRE FOR COMMUNITY MEMBERS

This study is being carried out by a post graduate student from the Department of Geography and Resource Development, University of Ghana, Legon, as a partial fulfillment of the degree of Master of Philosophy in Geography and Resource Development. The study seeks to analyse Water Resources Management in the Ekumfi District of the Central Region of Ghana. The sincere response you will contribute a lot to the success of the study. Please be assured that this study is purely for academic purpose and your identity will be held confidentially.

Date of interview……/……./……. Time of interview……..

Name of town/village……

Please tick [ ] or supply……where possible.

SECTION A- PERSONAL RECORDS/ BACKGROUND DATA OF RESPONDENT

1. Sex : Male [ ] Female [ ]
2. Age ……
3. Educational Level: a. None [ ] b. primary [ ] c. JHS [ ] d. O Level/SHS [ ] e. Technical/Vocational [ ] f. Tertiary [ ]

4. Marital status: a. Single [ ] b. Married [ ] c. Divorce [ ] d. Separated [ ] e. Widowed [ ]
5. Occupation: a. Farming [ ] b. Livestock rearing [ ] c. Fishing [ ] d. Trading [ ] e. civil/ public servant [ ] f. student [ ] g. others (please specify) ……

SECTION B: AVAILABLE WATER SOURCES AND THEIR ACCESSIBILITY

6. Which of the following sources do you get your water from? a. Pipe-borne water [ ] b. Dug well [ ] c. Community tank(s) [ ] d. Bore holes [ ] e. Stream/Rivers [ ] f. Sachet water [ ]
7. Which of the above mentioned water sources is your primary source of drinking water? ……
8. What do you think about the quality of your drinking water? a. Poor [ ] b. Good [ ] c. Very good [ ]
9. Where are these sources of water mentioned in question (6) located? A. in-house [ ] b. in the compound [ ] c. in the community (public) [ ] d. in other villages/towns [ ]
10. If in the community or from other villages/towns, how far is the water sources from your house? A. Less than 1km [ ] b. Between 1-3km [ ] c.3-5km [ ] d. Above 5km [ ]
11. Are you able to access water every time from these sources? Yes [ ] No [ ]
12. If no, why?.....
13. How much money do you spend on water a day? .....

14. How many buckets/gallons do u collect every day for your household…. A. less than 5 buckets/gallons [ ] b. between 5 and 10 buckets/gallons [ ] c. 10 and above [ ]
15. Are these buckets/gallons of water u fetch within a day adequate? A. Yes [ ] b. No [ ]
16. If yes/no to question 15, explain why……
17. How much time do you spend collecting water every day and why? ……..

SECTION C: KNOWLEDGE ON WATER LAWS/ REGULATIONS

18. What are some of the activities that affect water resources?
    a. Positive
       1……
       2……
    b. Negative
       1……
       2……
19. Are you aware of any regulations or laws that are meant to protect water bodies and use in this community? Yes [ ] No [ ]
20. If yes, what are these regulations?
    a. Traditional/Customary:
    1……
    2……

b.Legislative:

1……

2……

21. Do you obey these laws/regulations? Yes [ ] No [ ]

22. Why?

……..

23. Are you aware of any sanctions for disobedience? Yes [ ] No [ ]

24. If yes, state them:

a.Traditional/Customary:

1……

2…….

b.Legislative:

1……..

2……

SECTION D: COMMUNITY PARTICIPATION IN WATER RESOURCES MANAGEMNT:

25. Have you ever been involved in any planning and implementation of any water project? Yes [ ] No [ ]

26. If yes, when? ……..

27. How many times? …….

28. About how many men……and women……..were involved?

29. Which institution(s) was/were in charge of the last project you were involved in?
    a. The community [ ] b. Government body [ ] c. Non-Governmental Organisation [ ] d. Others (specify)……..
30. If no to question (29), state why? .....
31. Have you ever been educated on water resources management before? Yes [ ] No [ ]
32. If yes, how often? ……
33. When was the last time this education took place in this community? .....
34. How long did the activity take? …….
35. Which organisation was in charge of the activity? . a.Community [ ] b.NGO [ ] c.Government [ ]
36. What was the nature of the education? a. House to house [ ] b.The whole community [ ] c. Selected members [ ] d. School e. Market place [ ]
37. How effective was the education? ……
38. How do you think participation of community members in the planning and implementation of water projects both at community level and the district level can be improved to ensure the availability of safe and reliable water

APPENDIX 2

INTERVIEW GUIDE

1. What are the various problems associated with access to and management of water in the community?
2. What are the causes of these problems?
3. How do you solve these problems.
4. What are the laws and regulations that govern the use and management of water in the community?
5. What is the level of compliance by community members?
6. What are the sanctions to non-compliance?
7. What do you do as a community to ensure compliance by every member of the community?

COMMUNITY PARTICIPATION

8. What is the level of coordination/collaboration between the various stakeholders (community, CWSA, The District Assembly and NGOs) in water management issues?
9. Have there been any of such collaborations in the execution of a particular water project in the community?
10. Which categories of people are normally selected to participate in the planning and implementation of water resources management projects?
11. What is usually the numerical representation of men and then women?
12. How are community members educated on water resources management?

13. Through what media?

14. Which institution(s) is/are normally responsible of these exercises

15. What is the effectiveness of these campaigns?

16. How do you think access to water and the management of water resources in the community can be improved in a sustainable manner?

APPENDIX 3

IN-DEPTH INTERVIEW GUIDE

1. What is the situation in this community as far as water is concerned?
2. How important is water resources management to your office as the chief/assembly man or woman?
3. What are some of the activities your office as a chief/assembly man or woman has organised to create awareness on water resources management?
4. How effective were these activities?
5. What is the level of community compliance to water management regulations/ laws
6. What sanctions have you put in place for non-compliance?
7. What is your view on water resources management (with respect to streams and rivers) and access to portable (pipe-borne) water in the past and now?

PARTICIPATION

8. Have you organised any meeting with some community members to discuss water resources management issues?
9. Who were those involved in this meeting and what was the basis of selection of these members?
10. Have you ever been invited to participate in any meeting or water project organised by CWSA, The District Assembly or NGO?
11. If yes, when, where and by which organisation?
12. If no, why is it so?

13. Are there members in this community trained to fix faulty pipes/boreholes or to manage any water source?
14. Is there any WATSAN committee in this community?
15. How do you think your voice can be heard as the mouthpiece of the community at CWSA, District Assembly and water related NGO strategy planning and implementation meetings?
16. In your opinion, how can access to water and management of water resources and other related natural resources be done in a sustainable manner?

APPENDIX 4

IN-DEPTH INTERVIEW GUIDE FOR DWST

1. What is the situation as far as access to water is concerned in the Ekumfi District.
2. What are some of the issues associated with water resources management and water delivery in the district?
3. What are the factors behind these issues?
4. What is the CWSA doing about these issues?
5. What are the policies put in place regarding water resources management?
6. What are the specific strategies put in place to protect and conserve water resources?
7. What are some of the monitoring frameworks put in place to monitor the impact of these strategies?
8. How is data on water resources managed?
9. How does the CWSA come by financial assistance?

10. Are personnel adequate?
11. What are the mechanisms put in place for rehabilitation and upgrading of reservoirs, pipes and other water resources?

STAKEHOLDER COORDINATION

12. Has there ever been an avenue where CWSA has worked with other stake holders such as District Assemblies, NGOs, EPA, etc.
13. What are some examples of such programmes?
14. Averagely, how many times do such programmes take place a year?
15. How effective are such collaborations/coordination?
16. What role does the CWSA play in such collaborations/coordination?
17. What is the extent of coordination/collaboration between the CWSA and District Assembly, NGOs, GCWL and private organisations such as NGOs, CBOs, Civil society organisations etc.?

COMMUNITY PARTICIPATION

18. How often do you involve community members in planning and implementation of water projects?
19. On the average, what is the percentage of men and women who are usually involved in such projects?
20. At what stage and how often do you seek the opinion of community members when it comes to the planning and implementation of water project?

COMMUNITY EDUCATION

21. Are there any measures put in place to educate community members or create awareness on the effective use of water, as well as, management and protection of water resources?
22. Are people in the district aware of water resources use and management regulations?
23. How do you make them aware?
24. How many times a year?
25. How effective are these campaigns?
26. What is the level of compliance?
27. What policies have you put in place to make sure these regulations/laws are adhered to?
28. What are your views on the state of water resources management in the district?

APPENDIX 5

IN-DEPTH INTERVIEW GUIDE FOR EKUMFI DISTRICT ASSEMBLY

1. What are some of the challenges that the district faces with access to water resources management in general?
2. Which policies have been put in place to check water resources management?
3. What are the specific measures that have been put in place to check the enforcement of water laws?

4. What role does the District Assembly play in raising funds to support the provision of portable water and the management of water as a whole?
5. What is the extent of collaborations between the District Assembly and the CWSA?
6. What is your view on state of water resources management in the district?
7. How do you see the future of water resources management in the district?

APPENDIX 6

Calculation of Sample Size

In calculating the sample size for the study, the researcher adopted Cochran's (1977), formula for sample size calculation. According to Cochran (1977), if the proportion is larger than 5% (n/N>0.05) with a finite population, the following formula is appropriate in choosing the sample size.

Where, n' = sample size with finite population,

N = Population size about XXXX

Z = Z statistic for a level of confidence, 5% CI= 1.96

P = since I could not get P from a prior work a conservative value of 0.5 was taken and

d = Precision is 0.05

Hence, the sample size is XXXXX.

Since the researcher does not have all this information, but knows the total number, simplistic allocation will be used. This is a proportional allocation that will maintain a steady sampling fraction throughout the population.

$n_h = (N_h / N) * n$

Notation

- N_h = number of units in each stratum h
- n_h = the number of samples taken from stratum h
- N = the total number of units in the population , i.e., $N_1 + N_2 + ... + N_L$
- L = the number of strata or the number of strata.

The proportional allocation was used also because the researcher assumed that the cost in obtaining observations in each stratum is equal and the variability of these responses from each stratum is likely to be equal.

Hence the sample was reached through the following process:

Ekumfi Narkwa- 7722 Ekumfi Assafa- 5632 Ekumfi Abor- 2051

Ekumfi Ebiram- 929 Ekumfi Swedru- 385 Ekumfi Techiman- 626

N=7722 + 5632 + 2051 + 929 + 385 + 626

N= 17345 Z= 1.96 d= 0.05 P= 0.5

$$n = \frac{NZ^2 P (1-P)}{d^2 (N-1) + Z^2 P (1-P)}$$

$$n = \frac{17345\ (1.96)^2\ X\ 0.5\ (1-0.5)}{0.05^2\ (17345-1) + 1.96^2 \times 0.5\ (1-0.5)}$$

$$n = \frac{17345\ (3.8416) \times 0.5\ (0.5)}{0.0025\ (17344) + 3.8416 \times 0.25}$$

$$n = \frac{66632.552 \times 0.5\ (0.5)}{43.36 + 0.9604}$$

$$n = \frac{66632.552 \times 0.25}{43.36 \times 0.9604}$$

$$= \frac{166658.138}{44.3204}$$

$$= 376$$

APPENDIX 7

ANALYSIS OF SPECIFIC VARIABLES

Table A: Education Level of Respondents				
Setting			**Frequency**	**Percent**
Rural		None	26	29.9
		Primary	20	23.0
		JHS	28	32.2
		O Level/SHS	8	9.2
		Technical/Vocational	3	3.4
		Tertiary	2	2.3
		Total	87	100.0
Urban		None	43	38.1
		Primary	5	4.4
		JHS	25	22.1
		O Level/SHS	13	11.5
		Technical/Vocational	7	6.2
		Tertiary	14	12.4
		No Answer/ Blank	6	5.3
		Total	113	100.0

***Table B:** Occupation of respondents*

Setting		Frequency	Percent
Rural	Farming	50	57.5
	Trading	12	13.8
	Civil/Public servant	6	6.9
	Student	11	12.6
	Others	8	9.2
	Total	87	100.0
Urban	Farming	33	29.2
	Fishing	21	18.6
	Trading	22	19.5
	Civil/Public servant	19	16.8
	Student	15	13.3
	Others	3	2.7
	Total	113	100.0

Table C: Sources of water mentioned

Setting		Frequency	Percent
Rural	In the compound	2	2.3
	In the community (public)	61	70.1
	In other villages/towns	16	18.4
	No Answer/ Blank	8	9.2
	Total	87	100.0
Urban	In the compound	21	18.6
	In the community (public)	86	76.1
	In other villages/towns	5	4.4
	No Answer/ Blank	1	0.9
	Total	113	100.0

Table D: Distance of water source from home

Setting			Frequency	Percent
Rural		Less than 1km	64	73.6
		Between 1km - 3km	16	18.4
		No Answer/ Blank	7	8.0
		Total	87	100.0

Urban		Less than 1km	112	99.1
		No Answer/ Blank	1	0.9
		Total	113	100.0

Table E Money spent on water per day

Setting		Frequency	Percent
Rural	0 - 50p	25	28.7
	60p - 1.10GH¢	13	14.9
	1.20GH¢ - 1.70GH¢	11	12.6
	1.8GH¢ - 2.30GH¢	29	33.3
	No Answer/ Blank	9	10.3
	Total	87	100.0
Urban	0 - 50p	27	23.9
	60p - 1.10GH¢	52	46.0
	1.20GH¢ - 1.70GH¢	19	16.8
	1.8GH¢ - 2.30GH¢	15	13.3
	Total	113	100.0