MAKERERE UNIVERSITY

FACULTY OF TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

TO ASSESS THE PERFORMANCE OF THE CURRENT COMMUNITY BASED MANAGEMENT SYSTEMS (CBMS) IN MAINTENANCE OF RURAL WATER FACILITIES IN RAKAI DISTRICT

BY

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DECLARATION

I **Eng**. **SSENTABA Simon James** do here by declare that this report is my original work except where otherwise acknowledged.
It has never been submitted in any University for any award of a degree and in case any mistake is observable in the report I am entirely responsible.

Sign---------- Date----------

This dissertation has been submitted for examination with the approval of the following supervisors;

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

CBMS:	Community Based Management System
WUC:	Water User Committee
WSC:	Water and Sanitation Committee
O & M:	Operation and Maintenance
HPM:	Hand Pump Mechanics
LC1:	Local Council One
LC3:	Local Council Three
CDA:	Community Development Assistants
HA:	Healthy Assistants
DWO:	District Water Office
DWD:	Directorate of Water Development
SPSS:	Statistical Package for Social Scientists
MOFPED:	Ministry of Finance, Planning and Economic development
MoWE:	Ministry of Water and Environment
MoLG:	Ministry of Local Government
DRA:	Demand Responsive Approach
CBO:	Community Based Organisation
NGO:	Non Governmental Organisation
MDG:	Millennium development Goals

ABSTRACT

Problems with the operations and maintenance of water supply and sanitation have long been recognized as key constraints of the sustainability of water services. In Uganda today, the operations and maintenance of Rural Water Facilities (RWF) are largely based on the Community Based Management Systems (CBMS), which emphasizes community responsibility and authority over operations and maintenance of their water facilities. This study concerned itself with assessing the performance of community based management systems in maintenance of rural water facilities taking Rakai District as the case study.

The methodology consisted of administering a questionnaire to 267 respondents who included local water users, water user committee members, area pump mechanics, and local council one leadership, Sub-county Community Development Assistants, Health Assistants and hand pump spare parts distributors.

A total of 48 safe water points were sampled, comprising of nineteen (19) shallow wells, three (3) springs, twenty five (25) boreholes and one (1) valley tank. Shallow wells had a 73.7% functionality rate, springs 100% functionality rate while boreholes had a functionality rate of 56%. This implied that for future investigation where applicable, technological option of providing safe water by use of protected spring should be given highest priority followed by shallow wells and least borehole as results show that communities found it earlier to maintain spring than boreholes.

Unwillingness by community members to make any contribution towards operation and maintenance plus lack of spare parts within the community were noted as the major constraints towards operation and maintenance of water sources, hand pump spare parts were bought from Kampala 200km away. This led to a lot of delay plus increased costs on spare parts due to added transport, which greatly discouraged the communities in repairing their sources.

Community managed water points are vulnerable to a range of social, technical, institutional, environmental, financial, monitoring and evaluation constraints. Some of the constraints established in this study are that water committees lack capacities, trained committee members or operators leave (die) the communities and are not replaced on time, women being excluded from decision making though they are the carriers of water to the family, water supply technologies are not sometimes appropriate and are complicated, spare parts are hard to find, absence of

transparency in book keeping of collected maintenance fee, misuse of financial resources, political pressure/interference, poor mobilization and poverty among others.

The overall conclusion is that although community based management systems of rural water facilities is the best option so far towards sustainability of rural water facilities, little has been done to ensure their performance, they exist in words, absence of a legal framework to enforce CBMS makes it worst.

The researcher recommends that; government puts in place a legal framework formalising operations of CBMS, constant sensitization of the user community, availability of spare parts at least at every county level, availing of repair tools to area pump mechanics plus some form of remuneration for the WUC (certificates, exemption from other communal activities, incentives such as a bar of soap per quarter etc) are paramount towards a functional Community Based Management System of rural water facilities.

To ensure sustainability of water sources, communities managing their water sources need support from different angles. It is not fair to leave communities by their own after completion of a new water source. Institutional support mechanisms, policies, legislation, proper monitoring and continued capacity building are required to support the functionality of CBMS towards maintenance of rural water sources.

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Problems with the operations and maintenance of water supply and sanitation have long been recognized as key constraints of the sustainability of water services. In Uganda today, the operations and maintenance of rural water facilities (RWF) is largely based on the Community Based Management Systems (CBMS), which emphasizes community responsibility and authority over the development, operations and maintenance of their facilities (MoWE, March 2004).

Community Based Management Systems basically involve Water and Sanitation Committees (WSC), Water User Committees (WUCs), Pump Mechanics, Care Takers, Water User Association, which are basically involved in operation and maintenance (O & M) of rural water facilities.

Before introduction of CBMS, the role of sustainability of safe water points was entirely the responsibility of the Government. It was realized that the user community was not paying any attention to how facilities were being handled; as a result facilities were breaking down every other day. With increased funding into the Water Sector, so many new facilities were being put in place, which made it impossible for the Government to sustain the old facilities due to lack of both personnel and funds to under take sustainability.

According to the National Framework for Operation and Maintenance of Rural Water Supplies, a study was commissioned in May 2001, by the Ministry of Water, Land, and Environment through DWD Maintenance of Rural Water Facilities in Uganda. The study report presented significant number of findings that were discussed during a consultative workshop with key stakeholders in May 2002. During the workshop efforts were made to address the findings, something that was only partly successful. It is against this background that a decision was made

for the DWD to spearhead the development of a National Operation and Maintenance Framework for Rural Water to act as a guide for implementation of Operation and Maintenance (O&M) issues at all levels. This strengthened the National Water Policy (1999), which provided for User ownership and management of the rural water and sanitation facilities. It is upon such a background that an agreement was reached to empower the user communities to fully undertake operation and maintenance of the water facilities to enable the government to concentrate on the provision of new safe water points. Operations and maintenance is one of the ways of ensuring sustainability.

The term "Operation and Maintenance" has been used as a general concept covering a wide range of activities carried out on utilities by Government and communities in order to sustain their services and to maintain existing capital assets (Turyagenda, 2003).

Specifically, in the present context:

i) **Community** refers to a body of people having common rights, privileges, or interests, or living in the same place under the same laws and regulations

ii) **Operation** refers to the procedures and activities involved in the actual delivery of services, e.g. abstraction, treatment, pumping, transmission and distribution of drinking water

iii) **Maintenance** refers to the activities aimed at keeping existing capital assets in serviceable condition, e.g. by repairing water distribution pipes, pumps and public taps. Maintenance can be divided into three categories:-

- Preventive maintenance it means regular inspection and servicing to preserve assets and minimize breakdowns:
- Corrective maintenance it means minor repair and replacement of broken and worn out parts to sustain reliable facilities: and
- Repair it means (crisis maintenance) responses to emergency breakdowns and user complaints to restore a failed supply.)

Operation and maintenance (O & M) is therefore the sum of all activities required to achieve smooth running and continuous sustenance of a water facility to ensure long service.

iv) **Management** in this contest refers to the process of planning, organization, leading and controlling the efforts of the community members and using all the

other community resources to ensure that community water facilities are properly maintained.

v) **Sustainability** refers to whether or not something continues to work over time. In this case it means that water continues to be available for the period for which it was designed in the same quantity and at the same quality as it was designed.

The main potential benefits to a community of sustainable O & M are numerous, and include:

- Reduced time in water collection leading to increased time for more economically gainful activities for improved well being of the family;
- Improved health when combined with good hygiene practices to reduce disease morbidity and expenditures on health; and less dependence on external organizations that often have limited resources.

In 1998, the Government of Uganda was granted debt relief from donor countries and multilateral agencies under the Highly Indebted Poor Counties (HIPC) Initiative. This led to the formation of the Poverty Action Fund (PAF) in 1998 in order to channel the additional Government funds resulting from the HIPC debt relief initiative and mobilize further donor resources towards the key sectors identified in the Government's Poverty Eradication Action Plan (MOFPED 1997, revised 2000). The priorities that were set under PEAP are Rural Feeder Roads, Modernization of Agriculture, Implementation of the Land Act, Strengthening of Rural Credit, Financial Services and Rural Market Infrastructure, Rural Electrification, Primary Health Care, Primary Education, Water Supply and Sanitation. As a result of PAF and the HIPC Initiative, a lot of funds have been injected into the above mentioned sectors of which is water and sanitation.

Donor and Government Funds invested in the water sector currently amount to approximately $38M annually. These funds have been utilized to construct a total of 18,757 deep boreholes, 21,541 protected springs, 7,519 shallow wells, and 379 communal rain water tanks. As a result of these facilities, the National Safe Water Coverage has been increased from 18.4% in 1991 to 55% in June 2003 (Medium Term Budget Framework Paper, March 2004). A number of studies (Rural Water and Sanitation Reform Study 2000, National framework for operation and maintenance for Rural Water Supply 2001, the Rural Water and Sanitation Operation Plan, Rural

Water and Sanitation Strategic Plan 2000) have emphasized that, in order to strengthen the management of water facilities at community level, communities must formulate and operationalize CBMS.

If the Government's goal and target of achieving a sustainable safe water supply and sanitation facilities, based on management responsibility and ownership by the users, within easy reach of the rural population by the year 2015, with an 80-90% effective use and functionality of facilities is to be achieved (Rural Water and Sanitation Strategic Plan, SIP 2015) it is quite important to look seriously and practically into the sustainability of the rural water facilities that have been put in place.

The Rural Water and Sanitation Strategic Plan (SIP – 2015) clearly states that there is great need to enhance sustainability through the promotion of solutions that are manageable, approachable and adoptable at community level.

1.2 Statement of the Problem

Government, Donor agencies and communities have spent a lot of funds in the construction of safe water facilities; this has led to the national safe water coverage of 55% as at June 2003. To estimate this coverage, it was assumed that all the Safe Water sources that have been put in place are functional. A study on operations and maintenance conducted in 2001 found that only 71% of water facilities were fully functional and 19% partly functional, leaving 10% completely broken down.

Of the facilities completely broken down, 38% had been broken down for over two (2) years. Some of the causes of breakdown of point sources required as little as 5,000/= (buckets) but the communities were paying no attention.

A lot of efforts have been put in place by the Ministry of Water and Environment through Directorate of Water Development (DWD) which have led to formation of Community Based Management Systems (CBMS), but still the Operation and Maintenance of rural water facilities

especially within Rakai District is worsening. There is great need to look into the performance of CBMS from the grass roots, to really find out why a lot of money has been spent in constructing safe water sources aiming at communities benefiting from access to safe water but the problem of sustainability has persisted.

1.3 Scope of the Research

The research concentrated on the assessment of the performance of Community Based Management Systems (CBMS) in maintenance of Water Facilities in the Water Sector in Rakai District for the period 2000 to 2004.

The study involved interviewing several stakeholders among whom include benefiting household, Pump Mechanics, Water User Committees, Care takers, Spare parts supplies, Political personnel plus civil servants in order to find out the cause of poor sustainability of water facilities and recommend a way forward.

1.4 Justification of the Research

The normal methods of economic cost benefit analysis are not usually applied to a rural water supply project, because it is regarded as a social service (Asingwire, 2005). However, the discussion presented below states the impact of clean water supply on the general well being.

Poor hygiene and sanitation practices, compounded by low levels of access to safe water, a poor living environment are the major causes of 50% child morbidity. Children repeatedly infected with malaria, diarrhoea and intestinal parasites fail to grow normally and become prone to more infections with increasingly serious consequences, the outcome of which is either death or stunted development. The latter outcome contributes to low school performance and low productivity, which fuels the cycle of poverty. In addition, the burden of water collection and caring for the child infected with water and sanitation related diseases falls mainly on the women and girls, contributing to maternal malnutrition, low levels of girls' school enrolment and reduced opportunities for income generation.

A lot of resources are invested in provision of safe water facilities to rural communities. These resources are contributed by Government, Donor Communities plus the Private Sector. All such resources would be considered wasted if two years down the road if all the water points that were constructed break down due to lack of proper management.

Communities are the trustees of water facilities that have been put in place. It is realized that any failure or breakdown of these water sources is not consistent with Governments programmes of providing safe and sustainable water of up to 100% of the community by 2015.

From the Government Policy (MoWE, 2001), resources are always committed to the construction of new safe water points with only 10% earmarked for major rehabilitation and replacement of pipes in boreholes. Most of the day to day breakdowns on water points require minor repairs and maintenance. According to the County Water Officers quarterly reports, who carry out mobilisation, site verification and supervision, it is likely that when a source breaks down, the concerned community just abandons the sources and resort to their original traditional source.

Government has made an effort to form CBMS fully entrusted with O & M of water facilities but, the problem of sustainability has persisted. From a survey carried out by Rakai District Local Government Water and Sanitation Department in January 2004, it was indicated that out of the 362 boreholes in the District, 161 are not functioning, 140 shallow wells out of 430 are not functioning, and 23 protected springs out of 133 are not functioning, with quite a number of pumps vandalized.

Basing on the total number of safe point water sources constructed in Rakai from 2000 to 2004 the safe water coverage, which is based on constructed safe water sources is 42.6 %. While on the other hand, from 2000 to 2004, the actual safe water coverage which is based on the number of functional safe water sources is 31.3%.

These findings indicate a reduction in the percentage safe water coverage from 42.6% to 31.3%. It is therefore probable that much as CBMS have been put in place, not enough has been done to

implement them thoroughly on the ground and consequently they have not contributed to sustainability of the water sources.

There is need to look into the performance of the CBMS with the aim of establishing whether it is a manageable, affordable and adoptable solution by the community to address operation and & maintenance situation and if so, how they can be managed further.

1.5 Overall Objective

To assess the performance of the current Community Based Management Systems (CBMS) in Maintenance of rural water facilities in Rakai District and make recommendation for improvement.

1.5.1 Specific Objectives

i. Establish the number of CBMS in relation to existing rural water facilities.
ii. Establish the relationship between CBMS and improved sustainability/functionality of water sources.
iii. Establish the relationship between functionality and existing technological options.
iv. Establish the relationship between capital contribution and functionality.
v. Recommend an alternative CBMS

1.5.2 Hypothesis

The hypothesis statements for this study were.

H_o Community Based Management Systems could not guarantee 100% functionality rate of Constructed Safe Rural Water Sources.

The alternative hypothesis, against which the null hypothesis was tested, was;

H_a Community Based Maintenance Systems could guarantee 100% functionality rate of Constructed Safe Rural Water Sources.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

The chapter provides a review of relevant literature to the study. The review is presented in the sub-section that is related to the sub-themes of the study.

2.2 Planning of Infrastructure Maintenance

From his study (Byaruhanga et al, 2003), the initial steps in planning infrastructure maintenance include; asset inventories and condition assessments, resource inventories, task identification and definition, maintenance task standards, and strategy options. In regards to asset inventories the following are the conditions involved;

- The initial step in the inventory/condition assessment process is to determine the jurisdiction of the maintenance authority in question; that is to determine the geographical and functional zone of infrastructure elements to be maintained.
- The next step is to develop a complete list of all hardware, with relevant technical details.

On the other hand, resource inventory involves collection of data and development of indicators such as;

- Materials

The indicators to be used to examine material, equipment in maintenance agencies include;

  - Vehicles
  - Tools and equipment
  - Stores for equipment, tools, spares, materials.

- Finance

The indicators to be used to examine financing practice and resources include;

  - Source of funds
  - Annual maintenance expenditure
  - Percentage ratio of annual maintenance expenditure to total asset value

- Percentage ratio of annual maintenance expenditure to new capital investment.

Task identification and definition requires defining three types of maintenance tasks;

- Preventive maintenance
- Common corrective maintenance
- Rehabilitation tasks

For each task the identification should include data on; task name, brief description, and frequency (daily, monthly, annually, and biannually).

Another way of viewing task definitions is to consider them as maintenance – work quality standards; thus they define the level of maintenance service that should be provided.

2.3 Importance of Infrastructure Maintenance

The inadequacy of the operations and maintenance of infrastructure has serious consequences for economic and social development (Turyagenda et al, 2004). Poor maintenance of environmental infrastructure such as water facilities can also have negative impacts on the environment and public health; and it is often the urban poor and women, who are the most adversely affected. Women in the rural areas are greatly affected because they are the ones who collect water from the water points.

In general, the importance of infrastructure maintenance scales over economic, financial, technical, social, health, and environmental terms.

There are many significant social, health, economic and financial repercussions of inadequate maintenance, namely;

i) **Deficiencies in one maintenance sector often raise costs in another**. For instance, lack of safe water points can increase the budget for health since people will be depending on unsafe water sources.

ii) **Unnecessary investment in rehabilitation or new facilities**. Infrastructure systems which are not maintained will deteriorate faster, shortening their life, wasting scarce investment funds and precluding effective cost recovery. Since many of these funds are from credits, this can lead to a worse balance of payments.

iii) **Increased prevalence of water- borne diseases, and increasing mortality and morbidity** due to poor maintenance of water supply and sanitation systems. A lack

of upkeep will lead to high hand pump failures and service interruptions. In the extremes parts of the malfunctioned systems such as hand pumps, middle plates, bolts & nuts can be stolen. When this happens, there is a possibility of contamination of now the open unprotected water points, and also a possibility of anopheles mosquitoes breeding in the shallow wells.

2.4 Problems Associated with Maintenance Practices

In his study ((Turyagenda et al, 2004), he noted that there were many problems associated with the maintenance practices, which can be classified into technical, institutional, management, financial and policy. For instance the technical problems may include;

i) **Inappropriate/inadequate technologies**; maintenance operations are often hampered by limited access to tools, equipment and vehicles. In many cases, tools or equipment are simply not available due to lack of foreign exchange or financial resources. This means that planned maintenance activities can not be conducted on schedule.

ii) **Lack of skilled manpower**; improper performance of maintenance tasks is also a common problem which can be attributed to poorly trained, under-paid, unmotivated staff; or lack of oversight and standards enforcement by an overtaxed management.

iii) **Misuse/abuse of infrastructure**; the misuse of infrastructure can cause unnecessary demands for maintenance and repairs. For instance unnecessary banging of the handle of a hand-pump can cause it to pre-maturely break. Lack of user involvement during the project development contributes too much abuse of infrastructure facilities.

2.5 Poverty Status and Trends in Uganda

Uganda ranks 158 out of the 174 countries in the United Nation's Human Development Index, which compares life expectancy at birth, the adult literacy rate and per capital incomes (UNDP, 2002).

Over the past decade, income poverty trends have fallen dramatically in some parts of the country. Income or consumption poverty is measured by establishing a poverty line based on the level of income or consumption necessary for a minimum acceptable level of maturation and

other necessities of everyday life. People are considered poor if their income falls below this line.

Overall, income poverty fell from 55% in 1992 to 35% in 2000. Government aims to reduce absolute poverty to less than 10% of the population by 2017, (MOFPED, 2002)

From 1995 – 1997, the Government of Uganda launched a Poverty Eradication Action Plan (MOFPED 1997, 2000) as the guiding framework for the achievement of poverty eradication.
The implementation of the PEAP is performed under the Medium Term Expenditure Framework (MTEF), which integrated eight (8) policies making with expenditure based on strategic priorities and budget constraints. Priorities have been set under PEAP as rural feeder roads, modernization of agriculture, implementation of land act, strengthening of rural credit, financial services and rural market infrastructure, rural electrification, primary health care, primary education, water supply and sanitation.

According to Rakai District Development Plan (2004), a big proportion of the population is peasants, whose livelihood is basically ensured through subsistence crop farming. The majority of the population is involved in agriculture on a small scale using labour intensive technologies, which are greatly vulnerable to the adverse effects of HIV/AIDS and other socio-economic and physical conditions. Poverty in the district varies across sub counties in the district with high levels experienced in certain areas. Sub counties such as Lwamaggwa, Ddwaniro, Kyalulangira and Nabigasa that are prone to poor weather conditions such as drought or little rains usually experience low agricultural productivity. Rakai District HIV prevalence rate is 12%, which is very high compared to the National average of 6.4%. This high prevalence rate has contributed to persistent poverty in the district because of its effect on the productive workforce.

2.6 Government of Uganda Policy and Legal Framework

A number of policy and legal issues have been prepared by the Water Sector. The Rural Water and Sanitation Strategic Plan (DWD - SIP, 2000) states that, "Policies and Laws represent a comprehensive regulatory framework for the management of rural water and sanitation sub-sector". These include; the Water Statute 1995; the Local Governments Act 1997; the National

Water Policy 1999; the Land Act 1998; the Rural Water Sector Reform and Investment Plan 2000 – 2015; the Rural Water and Sanitation Operation Plan (2002-2007); the Water Sector Gender Strategy 2003; the National Framework for Operation and Maintenance for Rural Water Supply 2004, these are outlined below;

2.6.1 The Water Statute; 1995

The Water Statute, enacted in 1995 in line with the principles of the Water Action Plan (WAP, 1995), provides for the use, protection and management of water resources and supply, and the constitution of water and sewerage authorities. It also facilitates devolution of water supply and sewerage under takings (UPPC, 1995).

Compared to the earlier programmes such as UNICEF, WES, RUWASA, the water statute supported the community management, it states that, "Ownership and Management of Water Supplies must be undertaken by users through the creation of Water User Groups (WUGs) operating through water and sanitation committees (WUCs)". It further states that WUCs will be responsible for planning and Management of water systems, including collection and utilization of revenue.

The Water Statute considers cases whereby a water supply serves more than one WUG, and clarifies that the concerned WUGs shall come together to form a Water User Association (WUA) comprising of representatives of the various WUCs, responsible for management of the water system or point, set tariffs and collect revenue for maintenance of the system.

2.6.2 Local Governments Act 1997

The Local Government Act (UPPC, 1997) clearly identifies the District Local Council as being fully responsible for provision of water and maintenance of facilities in liaison with the Ministry responsible for natural resources.

Local Councils are empowered by the Act to make by-laws, subject to certification by the next higher council, or the Attorney General to ensure consistence with the constitution. This

particular section gave WSC or WUA the right to make by-laws to be adopted by the village council regarding the management and maintenance of their communal water facility.

2.6.3 The National Water Policy, 1999

The National Water Policy recognises operations and maintenance (O & M) as an important component in attaining water and sanitation coverage goals (MoWE,1999). Capacity building at all levels, involvement of women plus provision of services through demand driven approaches, where users are fully involved and contribute to costs so as to promote ownership are some of the key issues brought out clearly by the policy.

The Water Policy is based on the following six guiding principles;

- Integrated management of water resources and waste to protect the environment and safeguard health.
- An integrated approach with full participation of women.
- Community management of services.
- Financial viability of public utilities.
- Provision of services through demand driven approaches, where users are fully involved and contributed to costs so as to promote ownership
- Involvement of private practitioners in the management of utilities.

The management of rural point water facilities through Community Based Management Systems (CBMS) is emphasized identifying the community, private sector and Government back-up support systems being the key players leading to the success of CBMS.

As a result of this Policy all point water facilities are required to have WUCs with half the membership being women, and at least two caretakers.

This Policy confirms the roles of WUCs as responsible for management and maintenance, and should collect and manage (including banking) funds for maintenance and repair.

The Policy goes further to define the various roles of the other stakeholders, whereby the sub counties are supposed to form Sub-county Water and Sanitation Committees (SWSC) being responsible for initial resource allocation, and ensuring establishment of private hand pump mechanics and spare parts dealers.

The role of the private sector practitioners is to assist the WUCs with maintenance of tasks beyond their capacity. On the other hand the policy gives the roles of monitoring, back-up support to the District Water Office (DWO). Finally it stated that, rehabilitation or major repairs of boreholes are to be carried out by a Borehole Maintenance Unit (BMU).

2.6.4 The Land Act, 1998

The Land Act (UPPC, 1998) vests all rights to water resources in the Government. It empowers the Minister responsible for water to regulate the management and utilization of such water. The Act allows for reasonable use by the occupier or owner of a peace of land, of water for domestic and small-scale agriculture purposes.

The Land Act provides for a mutual agreement with the occupier or owner of land for execution of public works. When an agreement is not reached, the Minister can compulsory acquire the land. In all such cases the authorized undertaker is required to promptly pay compensation to any person having an interest in the land for any damage caused to crops or buildings and for the land used.

2.6.5 Rural Water Sector Reform and Investment Plan (SIP 2000-2015)

Inaccessibility of safe water supply was reported as one of the ten community priority problems in the Uganda Participatory Poverty Assessment Project (MOFPED, 2000). Poverty is caused by among others lack of clean and poor sanitation, because of the resultant disease burden and restricted production. These findings led the Government and other Development Partners to devote considerable efforts and invest in a bid to respond to this great need.

The Rural Water Reform Study aimed at basically provision of sustainable safe water supply ad sanitation facilities, based on management responsibilities and ownership by the users, within easy reach of 65% of the rural population by the year 2005 with an 80% - 90% effective use and functionality of facilities then eventually to 100% of the rural population by the 2015. “The principles of the Community Based Management are generally clear and will be adopted” states the reform.

The Water Sector therefore adopted the concept of Community Based Management System where the operation and maintenance costs for rural water supplies are to be fully borne by communities. Local and Central Governments are to provide back-up support and subsidize rehabilitation and costly repairs (MoWE, 2000).

The reform further stated that communities shall however, in the medium to long term pay major contributions for de-silting or the recovery of lost pipes. In the long term it is envisaged that communities will be able to fund major rehabilitation through collective effort, by remitting a percentage of community contribution for O & M to common pool at the sub-county.

2.6.6 Rural Water and Sanitation Operational Plan (2002-2007)

Similar to the previous legal framework this operational plan focuses on increasing water supply and sanitation coverage while ensuring sustainability (MOWE, 2002).
However, this plan goes further to give conditions for signing a Memorandum of Understanding stipulating the nature of cooperation and responsibilities between GoU, District, Sub-counties, communities and contractors before any work starts. Another important condition set by this plan is that CBMS through WSCs and WUCs must prepare a realistic and viable eight year O & M plan with guidelines from the District and Sub-county before any work can start. However the National Framework for O & M of rural water supply states that after subsequent discussions stakeholders agreed that 8 years is too long to be realistic at community level, and that a 3 year O & M plan is more realistic and should be prepared instead, which focus on full cost recovery and the lifetime costs and managing and maintaining the facility.

2.6.7 National Framework for Operation and Maintenance for Rural Water 2004

The Key goal of this Framework was therefore to provide guidance and policy direction for streamlining operation and maintenance in daily operations at all levels within the sector, to ensure long term sustainability of facilities and enjoyment of intended benefits. It formed a basis for the planning, implementation and monitoring of O & M to be used by all sector actors,

including government and development partners. This framework endorsed and regarded CBMS as one of the best options for O & M of communal water supply facilities in rural areas and rural growth centres.

It clearly states the roles of the community, sub-county, District, NGOs and CBOs, Private Sector, central Government and development Partners towards functionality of CBMS.

2.7 Aspects of Sustainability

Sustainability as earlier defined for the case of water refers to the continuous availability of water for the period for, which it was designed in the same quantity and at the same quality as it was designed.

There are basically two aspects of sustainability, which include;

- Environmental sustainability aspects
- Technological sustainability aspects

2.7.1 Environmental Sustainability Aspects

This basically involves two aspects; water quantity and water quality, in practice these two aspects are considered at the same time for resources to be used sustainably (MoWE, 2004).

Water in the earth's hydrosphere is part of a very active natural recirculation system with a relatively small reservoir. Solar energy is the driving force behind the various reactions which occur in the cycle. If the water balance is to be sustainable in a river basin or sub-basin and its underlying aquifer, then the competing demands on the use of the available resources need to be managed.

In planning therefore, the demand for water must be balanced with the water resources available. At the same time precaution must be undertaken during planning and construction to ensure protection of water supply sources from pollution and controlling pollution from sanitation systems.

2.7.2 Technological Sustainability Aspects

Sustainability requirements are a major concern in technology choice, and need to be emphasized at that planning stage. This enables communities to make an informed choice of the type of technology they would like based on suitability, cost and maintenance requirements. The source of water gives the initial guidance for instance springs (low or highland), groundwater or rainwater. The technology used for developing a particular source also has an important bearing on the O & M requirements, and should be carefully considered. For instance in areas susceptible to corrosion, resistant materials should be considered (MoWE, 2004).

Due to the usually hurried planning process lacking in bottom-up aspects, consultation and discussion on alternative technologies is not adequately done, which greatly contributes to the poor O & M (MoWE, 2004).

2.8 Community Mobilization and Training

It has been observed universally that mobilization and training assists in clearly defining the problems, options and roles. It is crucial that adequate mobilization and relevant training are provided at an early stage, to ensure that all stakeholders are supported to play their roles and that the magnitude of O & M requirements is well defined and planned for. This activity is continuous to maintain effective morale and involvement of all (MoWE, 2004).

Currently some mobilization is done during the implementation phase for communities to site sources and elect committees. Unfortunately many times it is not well targeted in terms of participants and content as well as hurried, due to the fact that contract procurement is done late, funds for both mobilization, actual construction and supervision are released at the same time and late while the districts are expected to spend that money within specified short period of time (Rakai District Local Government, 2004).

Mobilization of benefiting communities is supposed to take a minimum of 3 months before construction is done (MoWE, 2001). The training if carried out at all is many times done after construction, which ceases to make sense. Rarely is a needs assessment done to determine the specific needs of communities and committees to tailor the training event. Instead a standard and inadequate curriculum that glossed over the roles and responsibilities of committees, while

specifically weak in terms of skills that shall be required of committees is followed (Rakai District Local Government, 2004).

A total of six (6) people are recommended as the required number of members comprising a Water User Committee, which includes the following; Chairperson, Secretary, Treasurer, two (2) Caretakers, and a Committee Member. (MoWE, 2003)

To emphasise the feeling of ownership by the beneficiary communities, Water User Committees must be created even before the idea of getting a safe water source is perceived by the community. The committees are then involved in the decision making when regarding the choice of improved water point system, sighting of the improved water point, trained in running community meetings, collecting and managing maintenance funds, simple maintenance tasks plus signing "contracts" between the committees and the project implementers, sometimes with the Local Government officials as well, clearly defining the natural responsibilities (Alan, 1997).

Besides the formation of Water User Committees, the Community/Users after receiving initial information and mobilization by sub-county extension staff, apply for assistance and the sub-county will process applications based on agreed criteria. Communities whose applications are approved then sign some form of agreement with the sub-county accepting to meet all the routine (minor) operation and maintenance costs and thereafter pay 2-5% of the construction costs, depending on the technology option, before start of construction. If users choose service levels above the basic level (20-25 litres per capital per day) or opt for a more expensive technology instead of the appropriate low cost option, then they will be advised to meet the extra costs of such services (Rugumayo, 2008), this is referred to as the "Demand Responsive Approach", DRA.

2.9 Financing of CBMS

In line with CBMS, water users are expected to mobilize and manage funds for the maintenance of their water facilities. Management of funds at community level is one of the weakest links affecting O & M as it greatly hinders the collection of funds (MoWE, 2004).

At present most communities do not collect and keep funds in preparation of preventive maintenance and anticipated repairs. Instead they struggle to raise funds after a break-down has occurred, usually resulting in long breakdown time. In many cases hand pump mechanics undertake repairs, but do not get paid in time or at all. Training and follow-up programmes need to emphasize financial management and accountability aspects. In addition, communities need to be empowered to take disciplinary action when their funds are mismanaged or when agreements are not honoured.

Major repairs, including replacement of pipes, are also a major concern at present, particularly rehabilitation of boreholes, which are very common all over the country. Under CBMS sub-counties and district are required to budget for and contribute towards the costs of major repairs when the need arise. The Water Policy and the Operation 2000-2007 (MoWE, 2000) requires that Government (Local and Central) in the short run supports the cost of major rehabilitation, where this is beyond community capacity. The District Water and Sanitation Conditional Grant (DWSCG) guidelines allow for 10% meeting some of major rehabilitation.

As stated by (Haley, 2002) across the World, investigations shows that rural water and sanitation systems operate in the red. In 1999 a survey carried out indicated 64% of the 134 small communities that reported charging for water and sanitation services said they did not collect enough revenue to cover their costs; 37% of these utilities reported losses in excess of $20,000. the total deficit across 94 small communities was roughly $ 2.7 million in 1999.
The rapid expansion in number of water points and the ageing of existing pumps has left many areas unable to meet simple maintenance requirements.

2.10 Implications for Government Institutions on CBMS Operations

A lot of attention has been given to the community management of facilities in rural areas. Instrumental in this was the concept of VLOM — originally "Village Level Operation and Maintenance", which subsequently became "Village Level Operation and Maintenance Management". VLOM was based around the use of standardized hand pumps, with all routine inspections and minor repairs being carried out by trained people or ‘caretakers’ from the

community. A support mechanism for the reporting and repair of serious faults has to be put in place, but with minimum intervention by external agencies (Waterkeyn, 1993)

There are success stories where there was a very high level of support from NGOs. However, as VLOM was introduced in response to a perceived failure of the centralized approach due to inadequate government services, the real test of VLOM (Similar to CBMS) is whether or not it can succeed in an ordinary government environment

Despite the interest and efforts to develop community-based approaches for service delivery, serious problems have been found. Community support cannot be a substitute for weak government institutions; therefore, the need for effective government institutions cannot be avoided. Wherever such problems exist, and where there are no NGOs or other agencies to fill the gap, sustainability will always be difficult.

People in rural areas may prefer a household facility such as a well or simple hand pump if the aquifer is shallow. Some communities who would be unwilling to maintain a communal pump may be quite happy to invest in this option, which has been dubbed 'FLOM' (Family-Level Operations and Maintenance) (Waterkeyn, 1993). Family hand pumps are common in the Indian subcontinent and are installed without external support. While not robust, they are cheap and simple to fix and their popularity makes viable the commercial supply of spares. However, the affordability of family water supplies depends upon the availability and accessibility of groundwater.

2.11 Gender Effects on Performance of CBMS

"Gender" refers to describe those characteristics of men and women, which are socially constructed and therefore can change, in contrast to those that are biologically determined and therefore cannot change. Gender is thus a dynamic concept, which looks at the social divisions and the interrelations between men and women. It is related to how we are perceived and expected to think and to act as women and men, because of the way society is organized. Roles and responsibilities refer to the different work that men and women do for their different needs, their different access to resources and the different areas in which they can make decisions and exercise control over resources and benefits. These roles and responsibilities are socially and

culturally determined and differ from country to country. As the main carriers of water for domestic needs and as the principal movers of the family's hygiene habits, women's involvement in decision-making in the sector is of critical importance (Alan, 2003).

When community participation in water supply and sanitation started in the second half of the 1970s, it was synonymous with the participation of men. In project meetings and assemblies mainly men would participate. If women attended at all, their culturally prescribed role was to listen, not to speak and take part in planning and decision-making. Also in local planning and design, male leadership, would take decisions. Maintenance, financing and management training, functions and decision-making were also male prerogatives. Women, if participating at all, got mainly involved in the physical work. They helped in digging the trenches or provided food and drinks to well-digging teams. After construction, they would become mainly responsible for preserving hygiene around the new pumps and taps, doing preventive maintenance and site cleaning Alan, 2003).

Women's role as collectors and managers of water for domestic purposes and their primary responsibility as health providers and domestic managers is widely acknowledged especially in the Third World rural areas and need re-emphasis. Women decide as to which water sources to use for what purpose. Since gender is one of the most relevant hierarchies affecting water management, especially within households and communities, mainstreaming gender within water management, is an important step to enhance social equity.

In programmes in Guinea Bissau, Tanzania and Zimbabwe women were not consulted on the design and location of domestic water points. When the points did not meet women's requirements they were not used. However, in taking women's requirements on water use and location into account, has resulted in popular water points both used and supported in operations and maintenance (Alan, 2003).

Being directly affected by poor water supply and sanitation facilities, women are generally the most motivated to install improved water supply and sanitation facilities and keep them in running order. Yet initially all technical training for maintenance of water supply and installation of sanitation has gone exclusively to men. Training and employing of the women as hand pump

mechanics represent a big step for women who otherwise were unthinkable as it was considered exclusively men's job.

During its (UNICEF, 1989), experiment in Rajasthan, India, where 24 village women from the project area were trained to maintain and repair the hand pumps. Many of them were illiterate, but it became apparent that they were fully capable of the task. This was expanded to the whole project area. This represented a big step for women, who never have been able to earn their own money. That the pumps are in working order is obviously of greater interest to women than the men. Should the pumps break down, it is the women, not the men, who have to walk great distances to fetch water from contaminated and dirty sources. Thus the concept of community participation in the RWSS programme is not complete unless rural women along with their families play a responsible role in both its planning and management in RWSS sector.

The review of the implementation of Rural Water Supply and Sanitation Sector in India indicates that it would only succeed in achieving its universal coverage in a sustainable manner if the user-perspective and user-participation is ensured. Since women are more concerned about the availability of water for domestic use and sanitation, they should play a prominent role and take initiative collectively in raising the demand for an effective service, resources, installation, facilities to learn skills for operation and maintenance of the system. Participation of women in decision- making process requires the following essential features:

- Existence of a Village Level Water And Sanitation Committee (Similar to Water User Committee) with at least 50% women members, drawn from economically and socially deprived sections;
- An integrated and holistic approach for programmes related to education, health, sanitation, women's development and employment programmes may be placed under the supervision of this committee;
- The myth regarding women's technical capabilities needs to be diffused and women should be trained as pump mechanics and /or care-takers of the water supply so that they are not dependent for O&M of the systems installed on outside source. Training them as hand pump mechanics should be treated as employment opportunities for village economically and socially deprived sections of the society;

- The selection of technology should be gender friendly in terms of their choice, convenience and should be so adopted that a group of two or three women can collectively handle its operation and maintenance.

The strategies should seek to demonstrate the potential of Rural Water Supply and Sanitation (RWSS) for women's empowerment by expanding the process of participation, awareness building and strengthening women's groups at the grassroots.

2.12 Relationship between LC System and CBMS

Before the introduction of the Resistance Council (RC) systems in 1986 which later became Local Council 1992, the highest administrative unit within a community was the village chief. (*Mayumba – Kumi- Luganda*) the village chief had all the powers to punish whoever village mate disobeyed the village bye-laws. Whenever a drum (for the case of *Buganda*) was sounded, all concerned home stead had to appear and fully participated in that particular community activity, whoever would not appear, would fully be punished by the chief mainly by denying him/her access to a particular service (MoWE,2004).

At present CBMS can hardly enforce bye-laws as they have no *legal powers*. Whenever cases of households disobeying community bye-laws are reported to the LC I Chairman, or council, the Chairman who was elected by the same community cannot touch the electorate due to fear of losing votes. Intervention are frequently hostage to local political environments that both make community based management far harder to realize in practice, and more inherently conflict laden than is often assumed.

2.13 Comparison of CBMS with the previous Safe Water Management Systems

Before introduction of CBMS, the role of sustainability of safe water points was entirely the responsibility of the Government. It was realized that the user community was not paying any attention on how facilities were being handled; as a result facilities were breaking down every other day. With increased funding into the Water Sector, so many new facilities were being put in place, which made it impossible for the Government to sustain the old facilities, due to lack of both personnel and funds to under take sustainability. An agreement was reached to empower the

user communities to fully undertake operation and maintenance of the water facilities to enable the Government concentration on provision of new safe water points. This led to the introduction of Community Based Management Systems fully empowered with all operation and maintenance skills. CBMS were viewed as a better alternative as far as sustainability was concerned as compared to the previous system of government fully undertaking the role.
Having formed and empowered CBMS with all O & M skills, Government concentrated on the role of providing new safe water points to other communities.

2.14 Factors Influencing Equitable Distribution of Water Supply in Uganda

WaterAid Uganda in consultation with the Sector Performance Thematic Team (SPTT) carried out a study in the districts of; Apac, Nebbi, Sironko, Mayuge, Hoima, Wakiso, Mbarara and Luwero between May and August 2005 to ascertain factors influencing equitable distribution of water and sanitation services in Uganda.

It was revealed that there was a wide recognition at all levels of inequitable distribution of water and sanitation services in Uganda despite increased coverage. Kanungu district had the most equitable distribution of 44 (i.e. the average sub-county was within 44 people per water point of the district coverage while Kotido district had the most inequitable distribution with a deviation of 1,015 (Asingwire et al, 2005).

One of the key policy requirements in the provision of safe water and sanitation services is the Demand Responsive Approach (DRA). However adherence to the principles of DRA means that communities that fail to express effective demand are left un served. These are usually the low income groups, with influential politicians and many times lack information; this had also contributed to inequitable resource distribution.

The study came up with a conclusion that, whereas other factors such as natural occurrence of water, hydro geological factors and availability of funds combine to dictate the chance of technology for water services delivery, political influence seems to be decisive in actual allocation of water points to be contributed especially, where there is no accurate information and uncertainty about the technical criteria to use.

2.15 Scaling up Management of Water Supply – Ethiopian Experience.

The Millennium Development Goals (MDGs) for water supply and sanitation required Ethiopia to reduce by half the proportion of people without sustainable access to safe delivery of water and sanitation by 2015. Part experience had showed that it was not only coverage that needed to be increased but the sustainability of implemented water and sanitation systems as well, Much as the Ethiopian Water Resource Management policy clearly entrusted management, operation and maintenance of water facilities by the beneficiary community, from the action research carried out by Plan International, WaterAid and IRC in 2001 in Ethiopia revealed that community management had problems and constraints related to vulnerability, due to social, technical, institutional, environmental, financial and political constraints. As a result of these constraints, it was not fair to leave communities by their own after the completion of a new water and sanitation system. Institutional support mechanisms, policies, legislation, proper monitoring and capacity building were noted as elements of a sustainable water supply to rural people. The services ensures sustainable water supply to rural people. The service ensures sustainable water provision, equitable water provision and water provision to all, which was much more than putting in place infrastructure. Communities are the preferred managers of such services, but they can only do a good job if the above elements have been taken care of and support is in place. Within such framework both sustainability and coverage can be addressed. That is what is often referred to as scaling up (Atnafe, 2005).

From the action research, it was concluded that, sustainability of water and sanitation schemes had become a real challenge for the water supply sector development.

2.16 Water Supply through Community Participation – Sri Lanka Experience.

In his study (Ediriweera,2005), observed that long years of experience witnessing deteriorating village water and sanitation facilities has prompted policy makers and funding agencies to develop strategies to overcome the problems inherent with village local service delivery. Among the different approaches employed during the past decade or so, it was found that the 'community Based', ' Community Cantered' and ' Demand Driven' approach is not only feasible, but the most fruitful method to ensure sustainability. Involving the communities

actively in implementing projects at grassroots level ensures scheme longevity by improving maintenance through affording greater onus among the villages. This approach was started in Sri Lanka under the Community Water Supply and Sanitation (Pilot) Project (1993-1998) and was found to be highly successful. The project was rated in 2000 by the World Bank as "Best Practice" and "Well Managed among 200 similar Bank-funded projects around the world.

The Demand Responsive Approach (DRA) for implementation comprised sharing of capital costs and recovering of operation, maintenance and future replacement costs. DRA is also instrumental in transferring scheme ownership and management responsibility to Community Based Operations (CBOs).

The following were slated on the lessons learned from the Sri Lanka;

i) At the inception stage of the project, communities are reluctant to put their faith in the participatory development approach particularly due to the 'dependency' attitude and to-down experiences from the past. The participatory survey and preparation of action plans effectively breaks the barrier of traditional thinking and progressively involve the community in the mainstream of development.

ii) It was observed that construction material procured by the community, for various reasons, was more costly than central procurement. However, it was found that procuring through CBOs, outweighed the negatives on a scale of social benefits.

   a) large boost to the CBO confidence
   b) capacity development of the CBOs
   c) training to determine quality material and provide opportunity to purchase
   d) Better quality material and maintain optimum level of stocks for their own use.
   e) Instill a sense of ownership.

iii) The average recovery rate of the sanitation revolving fund under the 1st batch of implementation was found to be around 80%. This was an encouraging recovery rate that shows the success of the sanitation programme and the potential to fulfill the entire sanitation requirement of the community and projected needs, with comparison to the previously used sanitation subsidy (loan) system.

iv) In a country where poverty is an overriding factor and competition is an accepted way of achieving personal goals, it is refreshing for the communities to observe

large leaps of development towards common goals with far less effort through the participatory approach.

2.17 CBMS and Sustainability of Rural Water Facilities

Sustainability will be achieved through the existing management capacity of the community and institutions especially those established by earlier water and sanitation interventions (Rugumayo, 2008). These will be at four levels namely; village, sub-county, district and National levels and they will follow the principles of the community based maintenance system (CBMS).

These are explained below:

(i) **At the Source Level:** a village source committee (Water User Committee, WUC) or Borehole Management Committee will have been created, with at least half of the members being women, during the community mobilization phase. At least two caretakers will be appointed for each source, preferably women. The water source committee will collect a user fee from the residents and are responsible for the maintenance of the installation, including the use of bank accounts to safeguard the maintenance funds.

The Village Water and Sanitation Committees VWSC will charge a user fee to be paid by each of the household. This user fee is intended for routine preventative maintenance, minor and major repairs, to cater for the hand pump mechanic and source caretaker.

(ii) **At the Sub-county Level**: the private sector will be responsible for the activities at sub-county level. Private hand pump mechanics will undertake repairs and half yearly preventive maintenance of the hand pumps. Retail distribution of spare parts will take place through shops at sub-county level. The Local Council III (LC3) and sub-county water and sanitation committees will select the hand pump mechanics, spare parts dealers and pay for the training of mechanics. Extension staff and local Chiefs will provide back-up support and supervision.

Each gravity flow scheme (GFS) will have one or two scheme attendants. The Scheme Attendants / Plumber will be trained during design and construction. Each Attendant or Plumber is to be equipped with the necessary tools and transport (motorcycle or a bicycle) after training. They are to offer services as demanded by tap stands committees at a cost. All repairs will be done by the Attendant or Plumber and will be paid for by the Central GFS Committee or the Tap Stand Committee at the Sub-County or District.

(iii) **At the District Level**: wholesale and retail distribution of spares will take place through district-level spare parts dealers, appointed by the local spare parts manufacturers. The District Water Officer will monitor the function of the maintenance system, and will undertake the rehabilitation and repairs beyond the capacity of hand pump mechanics. In the meantime the Regional Borehole Maintenance Unit will be equipped and staffed to maintain the services beyond the capability of the community and local hand pump mechanics. It will be managed by the District Water Officer. In some instances, the private sector will be contracted for this work.

(iv) National Level: Spare parts distributors will provide spares and distribute them to private dealers at district level. DWD will monitor the general performance (through regular studies) of the maintenance system and take corrective actions at policy level as appropriate. DWD will also provide backup support and subsidize rehabilitation and costly repairs.

As an interim measure, the Government will continue to provide funds under the conditional grants for maintenance services beyond the capability of the community and local pump mechanics (e.g. fishing, de-silting or re-drilling). Such work will be carried out by the respective borehole maintenance units. In the long term, the private sector will take on this responsibility, and users will pay all costs.

2.18 The Demand Responsive Approach and Equitable Distribution

One of the key policy requirements in the provision of safe water and sanitation services is the demand-responsive approach (DRA). However adherence to the principles of DRA means that communities that fail to express effective demand are left un-served. Actual adherence to demand responsiveness is also sometimes hampered by late release of funds and the pressure to spend funds in time. Overall DRA is partially abused in order to fit in the existing circumstances which lead to inequitable resource distribution. A study (Asingwire et al, 2006) identified a number of factors that influence the equitable distribution of water supply and sanitation services. These are discussed under the different headings below:

i) Interpretation and understanding of sector strategies and policies

Equity is affected by limited or lack of knowledge of procedures that have to be followed in acquiring new water sources from the districts or sub-counties by the communities.

ii) Applicability of policies and guidelines

Although there is wide knowledge of the guidelines especially among technical staff of local governments, the district and sub county officials only partially apply these guidelines, or ignore them altogether. The interplay of political influence, lack of full knowledge by politicians, and inadequacy of resources undermines their application. The strategies and guidelines for the urban sub-sector emphasize financial viability, sustainability and water as an economic good. Majority of low-income earners in urban areas actually pay more per unit of water than consumers with house connections.

iii) Resource allocation

The resource allocation mechanisms used continue to disburse substantial amounts of grants to districts, whose coverage levels are well above the national average. Planning and budgeting within ceiling limits also means that districts receive inadequate resources to meet their needs in a given year, leaving some areas, like water and sanitation, un-served. There is lack of prioritization of sanitation both in terms of financing by central government as well as implementation and enforcement by district and lower level implementers.

iv) Donor and NGO funded projects

There is no formal mechanism at national level to direct the activities of donor projects and NGOs to the most deserving districts. Inequities tend to result in cases where some districts that were previously well served have continued to receive project and NGO support for a very long time.

v) Water coverage and monitoring data

Calculation of safe water coverage based on estimated number of users per improved water source alone is not adequate to reveal the equity situation. There are also problems related to consistency in data between the districts and the centre. At national level, calculations of coverage stop at district level, covering up inequities at lower levels. In turn, district calculations of coverage for sub-counties, obscure the inequities existing at parish and community level. Validity of data is also affected by non-functionality, due to lack of proper mechanisms to report

non-functional water sources. Validity of data on sanitation is more challenging due to complexity of sanitation.

vi) Other factors affecting equity

Other factors that potentially affect the equitable distribution of water and sanitation services are; population distribution and mobility, under-prioritization of community socio-economic status, leadership and commitment in relation to promoting sanitation, people's attitudes and values, and insecurity. It is important to consider natural hydro-geological factors, cost of water technology and political influence (real and perceived) and natural resource endowments.

2.19 Scaling up Community Management in Ganjam, Orissa - India

This case study was based on an integrated watsan programme implemented by UNICEF in Ganjam, Orissa, situated on the coastal plain of the Bay of Bengal. Orissa is one of the poorest states in India, with the highest rates of infant and maternal mortality in the country, as well as the lowest rate of sanitation in the country. Less than 5% of the State's population has access to adequate sanitation, and even less use the facilities provided (IRC,2003).

Ganjam (see the map opposite) has a population of about 3 million, of which 87% is rural. Administratively, the District is divided into 22 Blocks; each with an average of 120 villages, over half the population is designated as living below the poverty line.

UNICEF estimates that about 60% of the population has access to safe water - typically a communal tube well. Before the project started, sanitation coverage was measured as 4.7%. In 1999 there was a fundamental shift from top-down, isolated interventions to a demand-driven, community managed process. This fundamental change of approach and attitude has led to significant and sustained improvements.

i) Achievements

Before this shift in thinking, sanitation coverage was a meagre 4%. Three years later, the figure is 40% and growing. Over half of the villages so far included in the programme boast 100% coverage. More importantly, these toilets are being used.

An important part of the programme has focused on school sanitation and related hygiene. This has complements other demand based initiatives that have included garbage disposal and storm

water drainage to improve the village environment. Water supplies have been improved and there have been major changes in hygiene practices.

In all, over two hundred villagers have an established system of community management. 25% of the total cost of these improvements was borne by the community.

ii) How was this achieved?

UNICEF's strategy in Ganjam is based on model villages, in which intensive interventions were undertaken on a cost-sharing basis. The assumption was that these villages would serve as learning nodes and stimulate interest and demand elsewhere.

The process started with 14 model villages, each in a different Block. Each village was facilitated by a local NGO. To ensure that participation and decision making was mainstreamed, must use was made of PLA techniques and in particular the development of a community action plan.

The investment that people were prepared to make was considerable. In tangible terms, the cash, labor and in kind contributions amounted to over 25% of the project fund. This figure masks other inputs consisting of people's time, interest, knowledge and skills. In short, communities were prepared to mobilize their assets, in return for a controlling stake in deciding how resources were used.

The role of the intermediary NGO in this process - and the quality of its work - has proved crucial. A wide variety of methods were used to communicate ideas and promote messages. Women were helped to establish self help groups and join saving schemes. This has helped empower women as decision-makers, and is it this group that is largely responsible for the success of the project. Community managers have also been shown how to monitor the impact of their plan.

iii) Partnership

Scaling up such a system requires partnership. In all, there are six key partners: the community, the Watsan committee, the Block level NGO, a District level co-ordinating NGO, the District Administration and UNICEF. The result is a network, not a vertical structure. Key relationships are reflected in memorandums of understanding. A significant aspect of the Ganjam programme

is the involvement of the District administration, facilitated by UNICEF. For example, the District Collector (its Chief executive officer) has issued guidance for how Block level NGOs are to be selected. Village watsan committees have been recognized by the Administration, increasing their authority (for example, to collect and manage funds) and their credibility. In return, UNICEF has supported the District Administration with an extension worker who is responsible for day to day operation.

vi) Scaling Up

Following the success in 14 villages, the programme was expanded throughout Ganjam to 220. Each model village became a learning centre. Exposure visits stimulated interest and demand for expansion. Work in these villages is at an advanced stage. Quality has been maintained, but each village plan is unique reflecting local perceptions and priorities.

The challenge now is how to integrate this process with the Government of India's Sector Reform programme. Although both initiatives have much in common, the scale and time frame of the Sector Reform process poses new problems to be overcome, especially if quality is to be maintained. Some 10,000 villages are to be involved in five pilot Districts in Orissa, including Ganjam.

v) Lessons Learnt

- Community management only becomes a reality if decision-making, including financial control, is devolved to community level. This itself is a political decision, requiring political support.
- Decision-making implies that communities have choices to make throughout the project process. Systems are therefore needed to provide people with an informed choice of options.
- For community management to be effective, it needs quality facilitation. Quality cannot should not be sacrificed to achieve quantitative targets. Time frames need to be realistic. One developed, a successful demand driven approach can achieve more in three years than decades of top down service provision.

- Communities do not exist in isolation. Community management requires support, above all, political leadership. The results can overturn a top down attitude to service delivery and bring government on side.
- The capacity of local NGOs to facilitate community processes should not be underestimated. In Ganjam they play a vital role. The role of the private sector in service provision is also important but their current capacity is relatively limited.
- In terms of providing more technical options (for example, piped water supplies) and longer-term support, there is a need to mobilise local government institutions. How this can be achieved within the current framework is unclear.
- Ultimately, scaling up community management needs effective, sustainable partnership with communities, NGOs and government working to achieve common objectives.

2.20 Institutionalizing Community Management in Uganda

In his study (Negussie, 2003) noted that in recent years many development agencies in Uganda have focused on the promotion of participatory approaches to encourage bottom-up planning and empowerment of communities so that they take more control of development activities, which affect their lives. In the water and sanitation sector, small Non Governmental Organizations (NGOs) and Community Based Organizations (CBOs) have made a significant contribution to the development of these planning processes. The promotion of community-based participation and management leads to improved ownership and therefore sustainability of water and sanitation systems.

The Government of Uganda (GoU) has shown a commitment to community management and participatory approaches. A key objective of the National Water Policy 1999 is to provide: "*sustainable provision of safe water within easy reach and hygiene sanitation facilities, based on management responsibility and ownership by the users…"* Within the framework of the National Policy, community management of local facilities has been tried on a wider scale, with several large government supported, donor-funded water and sanitation programmes promoting community management and bottom-up planning.

However, despite these efforts there are limited examples of successful community management models, even on a small scale. Key problems identified are:

- A lack of understanding that community management is more than simply promoting some form of village level involvement.
- Lack of awareness of Uganda's diverse cultural mix. For example in Karamoja in the North East there are completely different cultures, attitudes and practices than in Baganda in central Uganda, making one country-wide approach difficult..
- Unclear roles and responsibilities, as well as lack of co-ordination, by government departments and other agencies.
- Focusing on private sector implementation in an effort to scale-up projects has caused a reduction in the quality and sustainability of the water points, due to lack of attention to community participation and management issues.
- Lack of understanding about the inter-relationship between community management, community decision-making power and the democratic process.
- Lack of understanding about institutional and legal frameworks within the government system that could facilitate the scaling-up of small scale integrated community management into national plans and programmes.
- Many NGOs/CBOS aren't self-reliant and are too small to be capable of advocating and promoting sustainable development concepts at national or district levels.

This case study is based on Water Aid's experience of its District Support Programme in Uganda.

2.20.1 Ability of the Community to Pay for O & M of Rural Water Facilities

In his study (Rugumayo, 2009), the Village Water and Sanitation Committees VWSC will charge a user fee to be paid by each of the household. This user fee is intended for routine preventative maintenance, minor and major repairs, to cater for the hand pump mechanic and source caretaker.

The *user fee* is calculated as follows;

i) A *hand pump mechanic* usually maintains 10 boreholes with hand pump in a Sub county and is paid UShs 50,000/= per month.

The design population for a borehole with a hand pump is about 300 persons

The design population for 10 boreholes with hand pumps is 3000 persons.

The average number of persons per household is 6

The total number of households is $3000/6 = 500$

In order to raise Ushs 50,000, each household must contribute Ushs. $50{,}000/500 = 100$ Ushs per month.

ii) The *source caretaker* will require to be paid for looking after the source an amount of Ushs 25,000 per month.

In order to raise Ushs 25,000 each household will contribute Ushs $25{,}000/500 = 50$ Ushs. per month.

(i) + (ii) =100 + 50 = UShs 150 per household per month.

The above amount will take care of the *hand pump mechanic* and *source caretaker*. For minor repairs, Ushs 100 could be added and for major repairs an additional UShs 250 is appropriate. The total *user fee* therefore becomes UShs 500 per household per month.

The average annual income of persons engaged in the agriculture sector is Ushs 140,000 per year for Northern Uganda, which is considered the lowest among the four regions in the country

In a family, there will be usually two bread winners. However, in the worst case, only one bread winner can be considered. The amount payable per year is Ushs 500 x 12 = Ushs 6000 for pump maintenance is, which is (6000/140,000) ~ 4% of their annual income to be used for maintenance of their water source. In the average case, with two bread winners the percentage will be about 2% of the household income.
The burden of school fees has also been reduced with the introduction of Universal Primary Education (UPE) in 1996. This amount is therefore considered affordable for the average household.

As regards to willingness to pay, there is ample evidence throughout the country from previously constructed water sources, under different programmes the UNICEF WATSAN, the NURP. The

User Fee of Ushs 500 is for the maintenance of water sources and in some districts there is a bye-law to this effect.

2.21 Summary of Literature Review

Poor water supply and sanitation is highly correlated to poverty and social degradation, with sickness in villages being water-related, leading to lower productivity and reduction in household earnings and funds for development. Much as various governments have put up quite number of safe water sources aimed at reducing water related sickness within communities, sustainability has proven a problem as clearly seen from the literature review above.

Whenever safe water sources break down, valuable time is lost unproductively in travelling long distance to fetch water. Women sacrifice opportunities for social and economic advancement. Young women are seriously affected missing out on formal education due to time spent fetching water, resulting in uneducated mothers; the engines of a family enhancement. Neither are they able to contribute a large part of the potential workforce. Community Participation approaches can redress a system of sustainable water supply as well as contribute significantly towards the Government's efforts on national poverty alleviation.

In conclusion, all the above stated studies show that CBMS is the best way to ensure sustainability of rural water facilities, they even go ahead to give details of the roles of all stakeholders towards successful O & M.

Unfortunately, no effort has been taken to find out why, much as CBMS have been formed, the situation as far as O & M of rural water facilities is concerned in worsening. There is need to look into the practicability of CBMS with the view of improving O & M of rural water facilities, with the aim of making it more effective, thus this research.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter describes the methodology aspects used in the study bringing out the various issues and tasks obtained in the process of data collection, analysis and presenting perceptions and problem involved.

The chapter consequently provides a description of the study area, research design, and instruments used to collect data, assignment and presentation of findings upon which interpretation, recommendations and conclusions were based.

3.2 Area of Study

This study sought to assess the performance of community based management systems (CBMS) in provision of rural water in Rakai District. The study was conducted in Rakai District, generally due to high non-functionality rate of water points furthermore this is where the author domiciled and employed, as already explained in the scope of the study.

Rakai District has total area of 4,989Km^2 and a population of 480,000 people as per 2002 census. At present Rakai District has a total of 925 safe water points comprising of 430 Shallow Wells, 362 Boreholes, and 133 springs. In addition, there are 18 big unsafe Valley Tanks (Unsafe from the bacteriological point of view) and 17 unsafe smaller valley tanks that have been put in place. All these total to 960 water points. It should be noted that the 925 safe water points referred to by the researcher exclude rainwater harvesting tanks since these are usually constructed at individual households who effectively maintain them. It is unfortunate however that out of the 925 safe water points, 324 are not functional (37%) and therefore this called for serious investigations to establish the cause of this non-functionality.

Fig 3.01 Map of Uganda Showing Location of Rakai District

It Should be noted that by the time of the research, both Rakai and Lyantonde Districts were still one District called Rakai District.

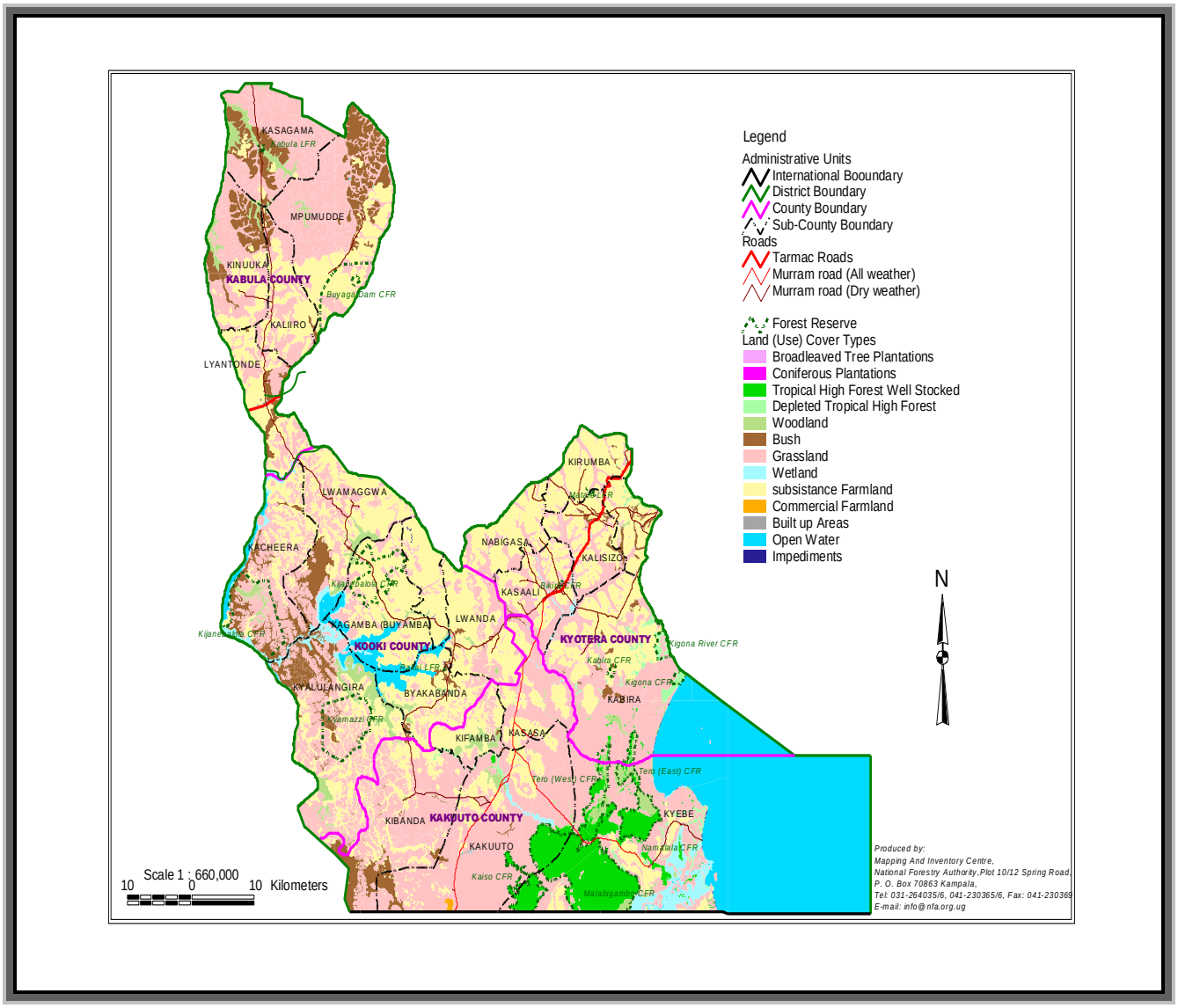

Fig 3.02: Map of Rakai District

3.3 Research Design

Having designed the study area, the researcher went ahead to choose an appropriate research design. The research was gender neutral where both male and female were interviewed. A deceptive and explanatory research design based on results obtained from questionnaires was adopted. On top of administering the questionnaire there was physical observation of the sampled water sources to establish their status vis-a-via year of construction, and technology

option used. Through these methods, the researcher was able to obtain constraints to improved functionality of existing water points.

3.4 Survey Population

The study was carried out among members of Water User Committees, general community, Local Council one (LC1) members, pump mechanics and sub-county officials. The subjects of the study involved all rural safe water points in Rakai District, which are 925 in number.

Included in the survey population were the local council leaders for the selected villages within which the selected water points lie, Water User Community, water user committee members, pump mechanics, sub-county chiefs, sub-county chairmen, health assistants and community development assistants.

This cross-section of people involved all categories of people in Rakai District ranging from the peasantry households to the policy makers including Baganda, Bakiga, Banyankole, Baziba and Bahima. The target population was persons above 18 years old as this is basically the group fully involved in collection of water.

3.5 Sample Selection and Size

Due to the large size of the population, which was at the same time scattered all over the District, multistage cluster sampling method (Mwakali et al, 2003) was used as shown in table 3.1.

Table 3.1: Sample Selection

Stage	Population	Sample	Description
1	4	4	All four counties were selected.
2	6	2	Each county has an average 6 sub-county of which two were selected
3	5	2	Each sub-county has 5 parishes on average of which two were selected
4	8	3	Each parish an average has 8 protected water points of which three were selected as indicated below.

3.5.1 Selection of Sub Counties

For each of the four counties in Rakai District (Kooki, Kabula, Kyotera and Kakuuto) all the existing sub-counties were written to papers and folded. Then randomly two were picked from each lot of a county. This resulted in the selection as shown in the table 3.2:-

Table 3.2: Selection of Sub-county

No	County	Selected sub-county	Number of existing safe water points as per District record
1.	Kooki	Byakabanda Lwamaggwa	53 49
2.	Kabula	Lyantonde Rural Kaliiro	41 29
3.	Kyotera	Kabira Nabigasa	70 50
4.	Kakuuto	Kasasa Kakuuto	57 74
Total Number of Safe Point water Sources			**423**

3.5.2 Selection of Parishes

Similar to the selection of sub-counties, all the existing parishes in each of the eight selected sub-counties above were written on individual papers, which were folded and two picked at random. This resulted in the following parishes as shown in the table 3.3.

Table 3.3: Selection of Parishes

No	Sub-county	Parish	Number of existing safe water points as per District records
1	Byakabanda	Byakabanda, Kamukalo	22 15
2	Lwamaggwa	Bugona Kibuka	11 8
3	Lyantonde Rural	Biwolobo Kalagala	3 12
4	Kaliiro	Kabatema Kyakuterekera	4 6
5	Kabira	Kyanika Bwamijja	12 12
6	Nabigasa	Nakatogo Kijeja	20 8
7	Kakuuto	Mayanja Bigada	11 10
8	Kasasa	Kabano Mityebiri	20 16
Total Number of Safe Point water Sources			**190**

Percentage of water sources selected from sub counties; $= \frac{190}{423} * 100 = 44.6 \approx 45\%$

The Average Number of Safe point water sources in each parish is;

$= \frac{190}{16} = 11.875 \approx 11.9$

Table 3.4 below gives the details concerning the type of water source in each of the parishes selected.

Table 3.04: Water Source types in the Parishes

No	SubCounty	Parish	Source Type	Number
1	Byakabanda	Byakabanda	H. Dug S-Well	11
			Borehole	4
			Valley Tank	2
			P. Spring	2
			H. Auger S-Well	3
			Sum	**22**
		Kamukalo	H. Dug S-Well	10
			Borehole	1
			P. Spring	2
			H. Auger S-Well	2
			Sum	**15**
2	Lwamaggwa	Bugona	Borehole	9
			Valley Tank	2
			Sum	**11**
		Kibuka	Borehole	8
			Sum	**8**
3	Lyantonde Rural	Kalagala	H. Dug S-Well Borehole	1 10
			Valley Tank	1
			Sum	**12**
		Biwolobo	Borehole	3
			Sum	**3**
4	Kaliiro	Kabatema	Borehole	3
			H. Dug S-Well	1
			Sum	**4**
		Kyakuterekera	Borehole	5
			Valley Tank	1
			Sum	**6**
5	Nabigasa	Nakatogo	H. Dug S-Well	7
			Borehole	2
			P. Spring	8
			H. Auger S-Well	3
			Sum	**20**
		Kijeja	H. Dug S-Well	4
			Borehole	1
			P. Spring	2
			H. Auger S-Well	1
			Sum	**8**

No	SubCounty	Parish	Source Type	Number
6	Kabira	Bwamigya	H. Dug S-Well	4
			Borehole	4
			P. Spring	2
			Valley Tank	1
			H. Auger S-Well	1
			Sum	**12**
		Kyanika	H. Dug S-Well	4
			Borehole	5
			H. Auger S-Well	3
			Sum	**12**
7	Kakuuto	Bigada	H. Dug S-Well	6
			Borehole	3
			H. Auger S-Well	1
			Sum	**10**
		Mayanja	H. Dug S-Well	3
			Borehole	3
			H. Auger S-Well	5
			Sum	**11**
8	Kasasa	Kabano	H. Dug S-Well	9
			Borehole	4
			P. Spring	3
			H. Auger S-Well	4
			Sum	**20**
		Mityebiri	H. Dug S-Well	9
			Borehole	4
			H. Auger S-Well	3
			Sum	**16**

3.5.3 Selection of safe water points

Prior to selection of safe water points in the selected parishes, it was necessary to determine the sample size. Below is a description of how the sample size was obtained.

Determining sample size (n) for each Parish:

- Considering a population of 190 (N) water sources in the selected sub-counties, and a highest level of precision of ±5% (e), the value of n was determined using Yamane (1967) simplified formula;

$n = \frac{N}{1+N(e)^2}$, where N= population, n = sample size, e = assumed level of precision

$n = \frac{190}{1+190(0.5)^2} = 3.9$

Considering the limited funding for this research, a sample size of n= 3 was taken. Therefore the sample size (Number of safe water points) that were considered for each parish were three (3).

Similar to selection of parishes, simple random sampling method was used to select three (3) water points per parish irrespective of status (functionality) and type. This resulted in the sample as shown in table 3.5.

Table 3.5: Sampled Water Sources

No.	Parish	Village	Source Name	Source Number
1	Biwolobo	Buyanja	WDD5732	Borehole
		Gayaza	WDD6323	Borehole
		Lyabuguma	GS1745	Borehole
2	Kalagala	Kinvunikide	WDD 6741	Borehole
		Kakondo-Kirangazi	WDD5995	Borehole
		Rwamayongo	WDD6723	Borehole
3	Kabatema	Kinoni A	WDD6607	Borehole
		Kabatema	WDD6003	Borehole
		Nkweyongede	Nkweyongede	Shallow- Well
4	Kyakuterekera	Byonge	Byonge	Borehole
		Kabazungu	Kabazungu	Borehole
		Kyenpisi	WDD6732	Borehole
	Parish	**Village**	**Source Name**	**Source Number**
5	Kyanika	Ziwa Zone	Nakasanje	Shallow well
		Kyanika A	Binoni	Shallow well
		Kyanika	Kyanika p/s	Borehole
6	Bwamigya	Zirizi	Kageye	Shallow well
		Bwanijja	Bwanijja	shallow well
		Nakatoogo	Munyangamba	Bore hole

7	Nakatogo	Ngoma A	Lubega	Spring
		Njeru	WDD7569	Njeru P/S Borehole
		Namiryango	Sadic	Shallow well
8	Kijeja	Kijeja	Lwebagira	Spring
		Kirembwe A	Kirembwe	shallow well
		Katana	Katana	shallow well
	Parish	**Village**	**Source Name**	**Source Number**
9	Mayanja	Kyamumbejja	Kyamumbejja	Shallow well
		Kabuta	Kabuta	Shallow well
		Kigeye	Kigeye	Borehole
10	Bigada	Kabugimbi	WDD7424 Kanyanyi	Borehole
		Nabigasa	Kyagalanyi/Budala	shallow well
		Nkoni	Nabyewanga	shallow well
11	Kabano	Nakagongo	Kabakyala	Shallow well
		Kabaale A	WDD7446	Borehole
		Bweregera	Bweregera	Spring
12	Mityebiri	Kasasa A	Dodoviko	Shallow well
		Mityebiri	WDD7444	Borehole
		Mityebiri	Kalunumo	Shallow well
	Parish	**Village**	**Source Name**	**Source Number**
13	Byakabanda	Kakumbiro	Sserogo	Shallow Well
		Byakabanda TC	Serinya Road	Borehole
		Lwanamboga	Lwanamboga	V.tank
14	Kamukalo	Kaami	Kyakibuye	Shallow Well
		Lukyamo	Kyentama	Shallow Well
		Kamukalo	Kagona	Shallow Well
15	Bugona	Kisamba	Kisamba	Borehole
		Lusana	Lusana	Borehole
		Mulebi	Mulebi	Borehole
16		Kyanika	Kyanika P/S	Borehole
		Kageye	Kageye	Borehole
	Kibuka	Serinya	Serinya	Borehole

This resulted in 48 water points out of the 190 in the originally selected parishes (About 25.3% of 190 water points in the selected parishes).

The distribution of the 48 safe point water sources is;

- 25 boreholes; Good sample representation since boreholes have the highest rate of non-functionality (44.5%)
- 19 shallow wells; Good sample representation since shallow wells have the next highest rate of non-functionality (32.6%)
- 3 springs; Good sample representation since springs have the least rate of non-functionality (17.3%)
- 1 valley tank.

3.5.4 Selection of Respondents for Particular Water Source

After selecting the water sources, the researcher went ahead to select actual categories of respondent to be interviewed. For all the sampled water points, it was compulsory to interview the caretakers because they are always close to water sources plus any other two members on the water committee. In addition, two members of the area Local council were interviewed plus one beneficiary (water user). This resulted in a total of six (6) people per water source that were interviewed. Apart from the caretaker who was compulsory for interview, other respondents were constantly alternated at each sample. For instance if at source x the chairperson was interviewed, then at source y the secretary for defence or woman affairs would be interviewed, and in this way the researcher was able to obtain view from all members of the water user committee and local council.

3.6 Level of Confidence

Whenever a sample is taken to estimate the entire population, we can never be 100% sure that the sample represents the population.

To what level (%) is one confident that results from a sample represents the entire population is a question, which will always disturb most researchers.

Commonly, many researchers prefer to use 95% level of confidence. However, 90% or 99% level of confidence can also be used (Cochran, 1963). Conversely, in the three levels mentioned, one would talk of 5%, 10% and 1% level of significance or error margin respectively. To use a

given level of confidence, the choice is normally in researcher's hands. To use 10% level of significance, for instance, is to allow a big margin for error!

During this research, a 5% level of significance was used firstly because the researcher was relatively sure of a representative sample and secondly analysis of results was to be done using Cross tabulation and Chi-Square (x^2) tests under SPSS computer software package, which Chi-square test was designed at a 5% level of significance.

3.7 Pearson's Chi-Square (x^2) Test

This test basically answers if there is any relationship between two variables, like in this case; this test was used to establish whether there was any relationship between Community Based Management Systems and Sustainability of rural water supply. Were rural water points with CBMS managed better than those without CBMS?

To answer the above question for example, cross tabulation was done using SPSS in order to establish whether any two variables had relationship or not. The number of independent values was then computed and counted using the formula below;

$$e_{ij} = \frac{\sum_i a_{ij} * \sum_j a_{ij}}{\sum_i \sum_j a_{ij}} \quad \text{.....3.1}$$

Where; the numerator represents the product between the total rows and total columns while the denominator represents the total of all data.

In order to make sure that the variables had a relationship (not independent) from each other, there was need to put the degree of independence as small as possible, say less than 5%. The number of 5% is called the error or mistake, that may happen by chance. It is also called the significant level. Probabilistic means were used to determine the degree of independence. This was done by computing the difference between the observed values (from the contingency table) and the expected values (from the independent table), followed by squaring the difference, and then dividing with the expected value and finally summing all the entries of the table. This is called the Chi-Square formula as shown in equation 3.2;

$$X^2 = \sum_i \sum_j \frac{(a_{ij} - e_{ij})^2}{e_{ij}} \quad \text{.....3.2}$$

Where x^2 is called the chi-square value.

The degrees of freedom were computed using the formula as shown in equation 3.3;

$$df = (total\ rows - 1) * (total\ columns - 1) \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.3$$

The probability was then computed using both the chi-square value and degrees of freedom obtained as shown in equation 3.4;

$$probability = (X^2, df) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.4$$

The resulting values were compared with the values obtained from tables or with those computed from Microsoft Excel using the formula as shown in equation 3.5;

$$probability = CHIDIST(X^2, df) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.5$$

3.7.1 Logic of Pearson's Chi-Square (x^2) Test

The chi-square test is a test of independency and states that "if the probability is lower than 0.05, then the two variables have relationship, otherwise we cannot conclude any relationship between the two variables in the contingency table." Or on the other hand the Chi-square test can also be stated that "if the computed Chi-square is larger than the Chi-square value from statistical tables, then the two variables have relationship; otherwise we cannot conclude any relationship between the two variables in the contingency table." Table 3.6 is an example of contingency table, indicating degree of freedom, chi-square values and Probability.

Table 3.6: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.079[b]	1	.079		
Continuity Correction[a]	1.822	1	.177		
Likelihood Ratio	2.945	1	.086		
Fisher's Exact Test				.112	.091
Linear-by-Linear Association	3.014	1	.083		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.83.

The number of independent values, Chi-Square value, probability, and degrees of freedom are all computed automatically in SPSS. Therefore this helped the researcher to save time as the laborious computations of independent tables were done automatically by the SPSS computer program.

Using the SPSS software we have the Chi-Square table where;

- The number under column headed "value" gives the computed Chi-Square value found in the Pearson chi-square row.
- The number under column headed "Asymp. Sig. (2 - sided)" gives the computed probability found in the Pearson chi-square row.

3.8 Data Collection

Having obtained the eligible respondents, the researcher had to collect vital information to answer the study objectives. Two (2) major methods were employed in obtaining data namely; personal interviews and observation.

Both personal interview one/ observations were carried out by the researcher together with research assistants using a questionnaire. The questionnaire was constructed in English but during the process of interviewing, interpretation hints in local languages were made. The researcher would ask respondents questions, which were mainly, open ended and then record the answers in the space provided under each question in the questionnaire.

Since the area of study was remote without any mailing service plus illiteracy of the respondents personal interviewing was used. It was also appropriate since it was flexible and the researcher could probe, build rapport for future research and also could keep the respondents interaction as well as being responsive till the end of the interview.

Observation on the other hand was a very important tool in the survey study. Here an observation guide (check list) of visited water sources was used. After the caretaker would conduct a tour around the water source to check on functionality, cleanliness around the sources, status of the drainage platform, cross bars (for the case of a pump well) absence of sanitation facilities within 30 metres of the source, presence of any record about the source especially concerning funds

collected and expenditure. All items observed were categorized as "'satisfactory", "unsatisfactory" or not available.

The objectives of the study were carefully introduced and respondents were assured of anonymity. On average all respondents responded happily as they appreciated the objectives of the study. For each interview completed the respondent was thanked.

3.9 Data Processing

3.9.1 Editing

After collecting data the responses from the field, the researcher edited them with the view of checking for completeness, accuracy and uniformity.

3.9.2 Coding

Since most of the questions were open ended questions, coding was really very necessary. Microsoft Excel spreadsheets were used for coding after which the data was exported to SPSS.

3.9.3 Data Analysis

The first step of data analysis was data coding. Data coding refers to the transformation of questionnaire data into another format that the computer can understand. Having coded the data, descriptive statistics were then computed using the data analysis tool in Microsoft Excel

To accept the results as having a significant association' the researcher tested them at 5% confidence interval. Whenever these tests were not appropriate, tables, simple frequencies and percentages were used to develop appropriate conclusions.

3.10 Limitations of the Study

During the study the researcher met a few limitations, which did not affect the results of the study but mainly hampered the speed at which the study progressed.

3.10.1 Translation of the Questions into Local Language

The questionnaire was written in English and so there was need to translate it into local language as not all respondents were expected to be literate. Some questions after translation seemed to lose the essential meaning but attempts were made to ensure that original meaning was maintained. This was done through probing and it helped to ascertain whether the respondents were answering the questions rightly.

3.10.2 Data Collection

i) Another serious problem faced by the researcher was local council officials. They felt unwilling to guide the researcher and to disclose problems hindering their programmes as failure would automatically reveal a sign of not being responsible and hard working. At first the LC officials thought that the researcher had come to evaluate their performance and a Government official who wished to know the people who were not active in the programmes of water management

ii) The respondents also wished the researcher to give them incentives "Give us something to drink if you want our information" one respondent asserted. The respondents were pre-occupied with the belief that the research was funded by the District Water Department which they believed had a lot of money. Some claimed that Makerere University students had money and therefore the researcher should buy for them a drink. The researcher however, insisted on assuring them that the research was academic and that he was not entitled to any payment.

3.10.3 Bureaucracy in Release of Research Funds

Much as the researcher is grateful for the sponsorship from I @ Mak.Com for this research, the bureaucracy releasing, these funds greatly delayed the progress of the research over three months were wasted because of this delay.

3.10.4 Conclusion

In conclusion therefore the researcher is of the opinion that in spite of all the limitations stated above, the results of this study have not been affected by the short comings and that the findings, which follow in chapter four have something to add towards filling in the apparent knowledge gap or at least constituted a foundation for further research on the performance of community based maintenance systems of Rural water supplies in Rakai District and Uganda as a whole.

CHAPTER FOUR

4.0 PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

In this chapter, data is examined in order to assess the performance of community based maintenance systems of Rural Water facilities in Rakai District and recommends improvements. Presentation and discussion of the findings of the questionnaire follows, starting with the social demographic characteristics of the respondents and ending with suggestion in how to improve sustainability of water sources.

It should be noted that while testing the hypothesis, the accepted level 0.05 (5%) was taken as had been set up earlier in the study.

4.2 Social Demographic Characteristics of the Respondent

The variables describing the characteristics of respondents in this study include age, sex and sources of income and position in society which the researcher believed would influence the sustainability of water facilities.

Table 4.1 Demographic Characteristics of Respondents

Age of Respondent	**No. of Respondents**	**Percentage (%)**
18-35	99	37.1
36-50	140	52.4
>50	28	10.5
Total	**267**	**100**
Sex of Respondent	**No. of Respondents**	**Percentage (%)**
Male	123	46.1
Female	144	53.9
Total	**267**	**100**

Source of Income of Respondent	**No. of Respondents**	**Percentage (%)**
Peasant farmer	187	70.0
Carpenter	3	1.1
Livestock Rearing	14	5.2
Petty Trade	22	8.2
Motor Cycle/Bicycle repairer	3	1.1
Salary earner Paid by Government	15	5.6
Radio Repair	1	0.4
Salon	1	0.4
Bodaboda man	6	2.2
Unemployed (House wife)	15	5.6
Total	**267**	**100**
Respondent's Position in Society	**No. of Respondents**	**Percentage (%)**
Chairperson LC1	29	19.1
Defense LC1	12	18.4
Information LC1	6	3.0
Women Affairs LC1	13	4.1
Treasurer LC1	8	2.2
Secretary LC1	10	1.1
Mobiliser LC1	9	2.2
Water Beneficiary (Water consumer)	7	4.1
Chairperson WUC	20	8.2
Treasurer WUC	19	5.2
Care taker WUC	34	18.0
Advisor WUC	25	0.4
Secretary for WUC	30	3.4
Mobilizer WUC	13	2.2
Member WUC	21	4.1
Pump Mechanic	11	4.1
Total	**267**	**100**

As clearly indicated by the table the majority of the respondents belonged to an age group in the range of 36-50 which gave a percentage of 52.4%.

The Table 4.1 further indicates that the majority of the respondents earn their living through peasant farming and as clearly indicated in the selection of respondents in the previous section, 95.9% of the respondents had positions of responsibilities within their communities.

Due to the results of Table 4.1 the research decided to run a cross tabulation relating the respondents position in society with sex, the results below were obtained.

Table 4.2: Relationship between Respondents position of responsibility in society and sex

Cross tabulation Relating Position to Sex		**Sex of the Respondent**	
Respondent's Position in Society	**No. of Respondents**	**Male**	**Female**
Chairperson LC1	29	23	6
Defence LC1	12	12	0
Information LC1	6	5	1
Women Affairs LC1	13	0	13
Treasurer LC1	8	3	5
Secretary LC1	10	8	2
Mobiliser LC1	9	7	2
Water Beneficiary (Water consumer)	7	3	4
Chairperson WUC	20	4	16
Treasurer WUC	19	3	16
Care taker WUC	34	10	24
Advisor WUC	25	14	11
Secretary for WUC	30	7	23
Mobiliser WUC	13	5	8
Member WUC	21	8	13
Pump Mechanic	11	11	0
Total	**267**	**123**	**144**

From the Table 4.2 above, it is quite clear that apart from advisors and pump mechanics, all the other positions of responsibility on the WUC were dominated by women.

The results further indicate that out of 34 caretakers interviewed the majority (24) were women, while all pump mechanics were men.

4.3 Management structure at the Water Points

As shown in Tables 4.3 and 4.4 below show the recommended and actual organization of the management structure at the water points.

Table 4.3: Recommended Structure at a water point

No	Title	Recommended Number
1	Chairman	1
2	Secretary	1
3	Treasurer	1
4	Caretakers	2
5	Committee member	1
	Total	**6**

Table 4.4: Actual Management Structure at the Water points

No	Title	Number
1	Chairman	1
2	Secretary	1
3	Treasurer	1
4	Caretakers	2
5	Committee member	1
6	Mobiliser	1
7	Advisor	1
	Total	**8**

It can be seen that the actual structure found at the sources is composed of 8 members, which is in excess of the 6 recommended by two.

4.4 Functionality of Water Points in Relation to Technological Options

As shown in Table 4.5, out of the 25 boreholes sampled 11 were not functional indicating the highest non functionality rate of 44%, shallow wells had a non functionality rate of 26.3% while all the sampled spring were functional.

Table 4.5: Relationship between the functionality and technological options

Type of Water Source	Functionality of Water Source		Percentage non Functionality
	Functional	Not Functional	
Shallow Well	14	5	26.3
Protected Spring	3	0	0.0
Borehole	14	11	44.0
Valley Tank (Hand Pump)	0	1	100.0
Total	**31**	**17**	**35.4**

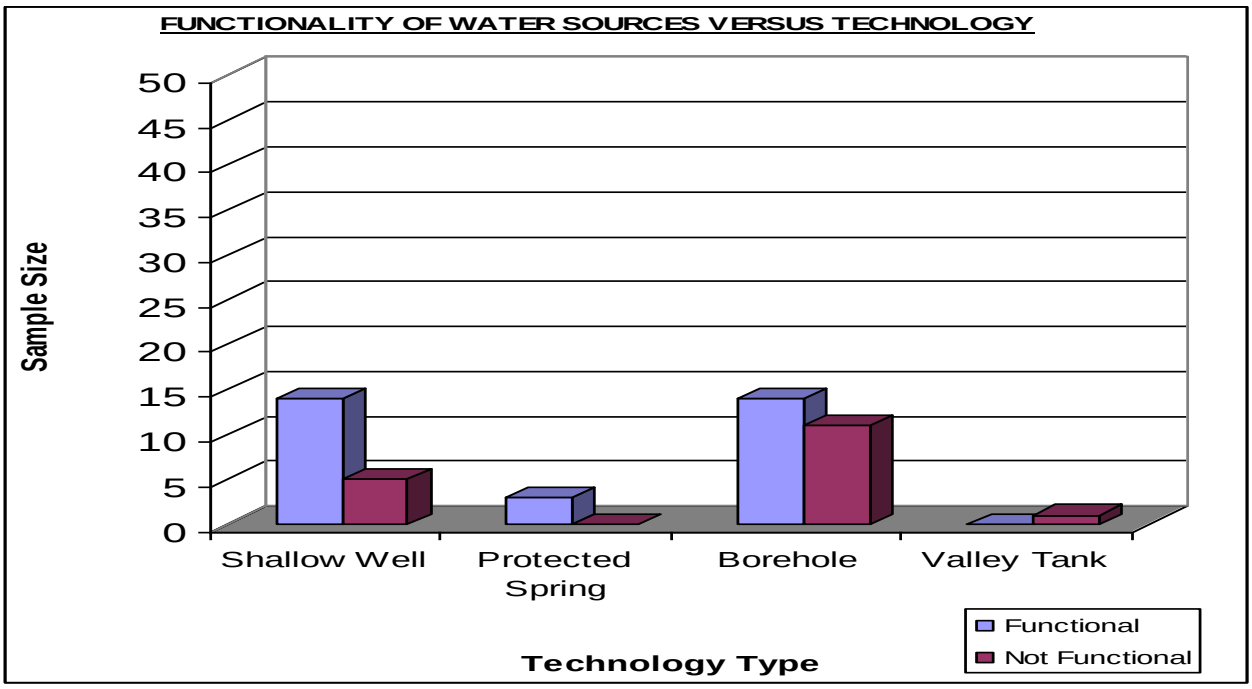

Fig 4.1: ***Relationship between functionality and technological options***

This implied that for future investigation where applicable technological option of providing safe water use of protected spring should be given highest priority followed by shallow wells

and least borehole as results show that communities found it earlier to maintain spring than boreholes.

Fig 4.2: ***Researcher Taking Notes on a Non Functional Borehole***

4.5 Functionality of Water Points in Relation to Presence of Water User Committee

Out of the 48 water points sampled, forty (40) had functional water management (management) committees of which twelve (12) sources were not functional. As shown in Table 4.3, of the eight (8) water sources without water management committee five (5) were not functional.

Table 4.6: Functionality in relation to sources with WUC

Sources Having WUC	**Functionality of Water Sources**	
	Functional	**Non Functional**
WUC Available	28	12
No WUC	3	5
Total	**31**	**17**

This implied that 30% of all sources with Water User Committees were not functional, while 62.5% of sources without Water User Committees were not functional.

Fig 4.3: ***A non functioning Shallow well at Kalunumo Village***

4.6 Ownership of Water Facilities

The researcher proceeded to establish whether the community showed any sense of ownership towards the water facilities, put in place as this is a key factor towards sustainability. Any form of capital contribution in terms of labour, cash and local materials was considered by the researcher as such community having associated with such project thus ownership. Table 4.7 below gives the results concerning any form of capital contribution.

Table 4.7: Capital Contribution by community

Contribution	Frequency	Percentage
Yes	86	24.1
No	177	66.3
Don't Remember	4	1.5
Total	**263**	**100.0**

Of the 267 respondents, 24.1% confirmed of having made some form of contribution towards capital development of their water sources.

Fig 4.4 shows that most contribution is in form of manual labour, followed by provision of food to workers, then cash contribution and local material being the least.

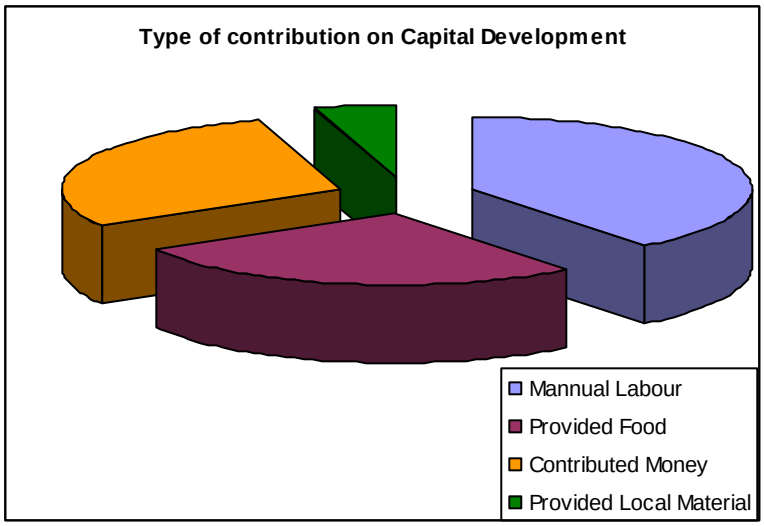

Fig 4.4: ***Type of contribution towards capital development***

Table 4.8: Type of contribution towards capital development

Type of Contribution	Frequency	Percentage
Manual Labor	34	39.5
Provided Food	23	16.7
Contributed Money	25	21.7
Provided Local Material	4	4.4
Total	**86**	**100.0**

Various reasons were given for either having made a contribution or having not contributed at all.

The 86 respondents who made contribution towards protection of their water facilities gave reasons like "They very much needed clear and safe water with easy access;

The facility was beneficial to the community; contribution was a requirement for accessing safe water; it was ethical (human) to provide food to the workers.

On the other hand, the 181 (177 + 4) respondents that did not make any contribution towards protection of their water source and gave reasons like " to them the facility was donated by the government; some LCI leaders could not contribute because as LCs leaders they are not paid any allowance; some believed it was the role of government to provide them with safe water thus no need for any contribution; poverty was righted as one of the constraints and finally some claimed not being aware of any contribution".

From Table 4.8 above reasoning of both those respondents who contributed and those who did not, the researcher was able to conclude that there was lack of adequate mobilization of the beneficially community at the implementation stage of the water facilities where no contribution was realized. With adequate sensitization of communities before actual implementation is done, community showed an interest in making a contribution towards protection of their water facilities thus being interested in owning those facilities.

4.7 Performance of the Water User Committee

Table 4.9 indicates that 29.2% of the respondents were satisfied with the performance of the Water User Committee giving reasons like, " Committee gives feedback to community, takes good care of the source; try to collect money but Chairman LCI interfere; display accountability charts to the community".

On the other hand, the 67% that is not satisfied with the performance of the WUC gave the following reasons," the source breaks down a lot; poor financial management as no accountability shown; water was salty (though the researcher believes this was not a fault of the WUC); demand allowances; do not mobilize community; not trained."

Fig 4.5 shows that the biggest numbers of respondents are not happy with the performance of WUCs

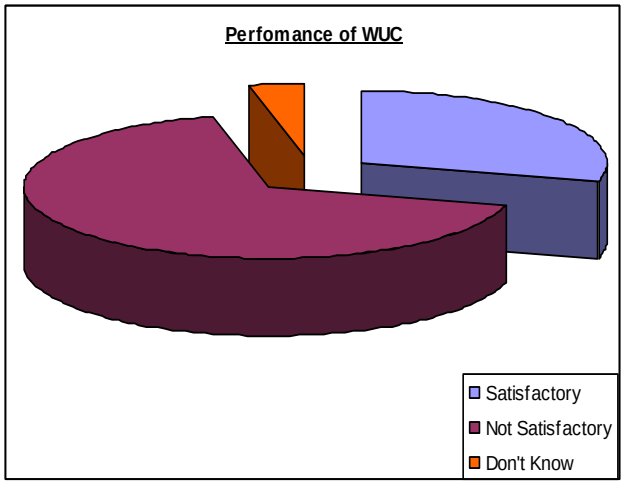

Fig 4.5: ***Rating the performance of WUC***

Table 4.9 shows the various levels of satisfaction derived from the respondents.

Table 4.9: Rating the performance of a water user committee

Performance of WUC	**Frequency**	**Percentage (%)**
Satisfactory	78	29.2
Not Satisfactory	179	67.0
Don't Know	10	3.7
Total	**267**	**100.0**

With the above reasoning from the respondents, the researcher concluded that with retraining of the existing water user committee members followed with constant sensitization of all the stakeholders, the committees would be able to play a bigger role towards improved sustainability of water facilities.

Fig 4.6: ***Broken hand Pump on Lwanamboga Valley Tank***

4.8 Remuneration of Water User Committee

Of the 267 respondents, 50.2% strongly recommended remuneration of Water User Committee, which remuneration was expected to be in form of;

- 11.2% recommended exemption of WUC members from paying for any repairs required of a community.
- 85.8% recommended facilitation in terms of allowances from the District
- 3% recommended transportation facilitation such as bicycles from the district

Table 4.10: Shows the remuneration of WUC

Should WUC be Remunerated	**Frequency**	**Percentage**
Yes	134	50.2
No	126	47.2
Don't Know	7	2.6
Total	**267**	**100.0**
How Should WUC be Remunerated	**Frequency**	**Percentage**
Members exempted from paying for repairs	15	11.2
Allowance to be Paid by the District	115	85.8
Given incentives(Transport) by District	4	3.0
Total	**134**	**100.0**
Is your WUC Remunerated	**Frequency**	**Percentage**
Yes	78	29.2
No	186	69.7
Don't Know	3	1.1
Total	**267**	**100.0**
How is Your WUC Remunerated	**Frequency**	**Percentage**
Exemption form contributing for Repairs	10	12.8
Not sure	68	87.2
Total	78	**100.0**

Much as 50.2% of the respondents reorganized the need to remunerate WUC members, at present only 29.2% were remunerating their water user committee with 69.7% not doing so. Of the 29.2% that were remunerating their WUC only 12.8% were able to clearly specify the kind of remuneration offered to WUC members as being exempted from communal contribution, whenever there is need to contribute money by the community especially, once a source breaks down.

With the above findings, the researcher realized that with proper management and attainment of a high level of sustainability of water sources, some form of remuneration be it allowances,

recognition in form of certificate, exemption from other communal duties was very necessary to motivate WUC members.

4.9 Training of Water User Committee Members

All 93 water user committee members interviewed new at least one of their roles. However as clearly indicated by Table 4.11, only 21.5% had ever been trained in their roles while 78.5% had never had any training at all on their roles, they were learning through their own experience. 81.7% of the WUC interviewed recommended for constant retraining to be equipped with new skills. All the 14 WUC treasurers requested for training in simple book keeping techniques.

This implied that all water user committee members interviewed were trying their level best to carryout their duties despite lack of training from the relevant stakeholders, once training is intensified, WUC would be able to perform perfectly well.

The Table 4.11 shows the various aspects of training for the Water User Committees.

Table 4.11: Training of WUC

WUC Members Aware of Their Roles	**Frequency**	**Percentage**
Mobilization of Community Towards Contribution for O&M	27	29.0
Collect and Keep Money	15	16.1
Taking care of the Well	42	45.2
Give Advice to Members	1	1.1
Taking Minutes and Records of the WUC	4	4.3
Giving Beneficiaries Information about the Well	4	4.3
Total	**93**	**100.0**
Ever Been Trained as WUC Member	**Frequency**	**Percentage**
Yes	20	21.5
No	73	78.5
Total	**93**	**100.0**
Need for any Further Training	**Frequency**	**Percentage**
Yes	76	81.7
No	17	18.3
Total	**93**	**100.0**

Areas Where Training is Required	Frequency	Percentage
Mobilization Skills	16	21.1
How to remove sality	5	6.6
How to repair Water source	20	26.3
How to Carry out Proper Book Keeping	14	18.4
How to Prevent randomisation of well parts	15	19.7
Non Responsive to this Question	6	7.9
Total	**76**	**100.0**

4.10 Contribution towards Operation and Maintenance of Water Facilities

From Table 4.12, of the 267 respondents, 27% had ever made a contribution towards operation and maintenance of their water source.

Table 4.12: Contribution towards O & M

Contribution towards O & M	Frequency	Percentage
Yes	72	27.0
No	183	68.5
None Responsive	12	4.5
Total	**267**	**100.0**

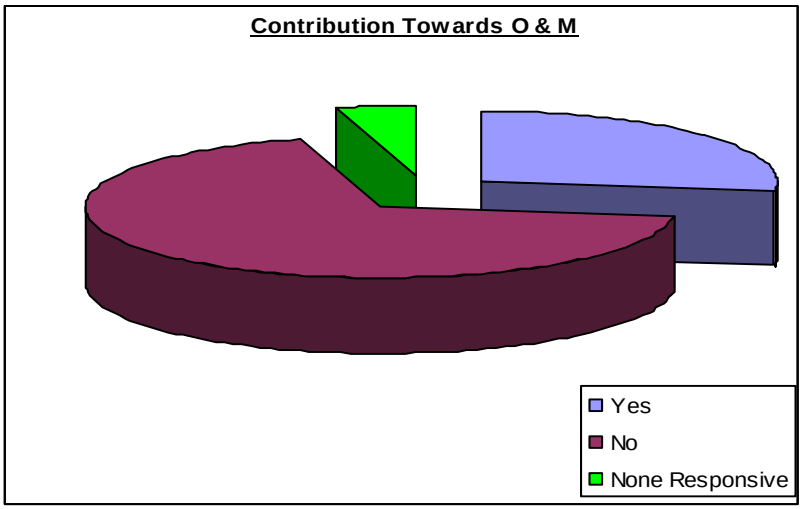

Fig 4.7: ***Shows Contribution towards O & M***

Table 4.13 shows the statistics for the amounts contributed by the community.

Table 4.13: Amount of contribution made

Contribution(Shs)	Frequency	Percentage
0-500	12	6.6
600 - 1000	71	38.8
1,100 - 5,000	37	20.2
6,000 - 1,0000	8	4.4
15,000 - 50,000	45	24.6
60,000 - 100,000	8	4.4
>100,000	2	1.1
Total	**183**	**100.0**

From Table 4.14, the researcher observed that even though some contribution was made by 27% of the respondents, 86.3% of such respondents made their contribution whenever their water source broke down, while 10.4% contributed only during the dry season when they had no alternative source of water, see Table 4.14

Table 4.14: Frequency of contribution

How Often	Frequency	Percentage
Whenever the source breaks down	158	86.3
During dry season	19	10.4
Non Responsive	6	3.3
Total	**183**	**100.0**

Having obtained the percentage of respondents that had made some contribution towards maintenance of their water facilities, the researcher went further to investigate how such contribution was kept.

As indicated by table 4.15, of the 48 water sources sampled of which 40 had functional WUC, 54.25% kept their contribution with the committee treasurer, 12.6% with the committee Chairperson while 22.9% with the area LC1 chairperson. One water source in Lyantonde Rural

sub-County had a functional Bank account in Victoria Bank, Lyantonde Branch with a total deposit of shillings 95,045/=.

With the above results, it was concluded that there was still great need of training of WUC member on their roles plus sensitization of community as some committees much as they had a treasurer, kept their funds with the area chairperson LC1 rendering the treasurer of the WUC useless.

Table 4.15: How money is kept

Who Keeps the Contribution	**Frequency**	**Percentage**
Treasurer WUC	26	54.2
Chairperson WUCs	6	12.5
Chairman LCI	11	22.9
Caretaker	2	4.2
Village Account	2	4.2
Victoria Bank Lyantonde T.C	1	2.1
Total	**48**	**100.0**

Fig 4.8: ***Research Assistant Tests the Functionality of Buyanja Borehole***

For those members (68.5%), who had never made any contribution towards operation and maintenance of their water facilities, the following reasons were given;

Table 4.16: Shows reasons for not making Contribution

No	Reason	Frequency
1	Chairman LCV always repaired their sources whenever they broke down	38
2	High poverty level within the community	15
3	Not aware of any Contribution	52
4	The water facilities belong to the district	22
5	LC1 leader could not contribute since as leaders also were not getting any allowances for their services	18
6	Water quality was poor (Salty)	5
7	WUC members who had been exempted from any contribution by the water user community	17
8	Chairperson LCIII always paid for the repair of their water sources	11

4.11 Availability of Spare Parts

Table 4.17, indicates that 43.8% of the respondents obtained their spare parts from pump mechanics, while the pump mechanics claimed to have obtained such spare parts from Masaka hardware shops.

Table 4.17: Availability of spare parts

Source of Spare Parts	**Frequency**	**Percentage**
From Local pump Mechanics	117	43.8
From District	41	15.4
From Sub-county	10	3.7
From shop in Masaka	24	9.0
From Bicycle mechanics	68	25.5
I do Not Know	7	2.6
Total	**267**	**100**

From table 4.17 above and from Table 4.18 below, it is quite clear that WUC members and pump mechanics travelled very long distances to access spare parts, which distance in most cases made such spares unaffordable due to added transport expenses. The whole of Rakai District did not have a borehole/shallow well spare parts shop.

Table 4.18: Duration to obtain spare parts

Time (Days)	Frequency	Percentage
1-7	175	67.3
8-14	24	9.2
15-30	24	9.2
31-60	17	6.5
61-183	13	5.0
>183	7	2.7
Total	**260**	**100.0**

4.12 Remuneration of Pump Mechanics

Of the 11 hand pump mechanics interviewed, 72.7% (8), were being paid by the community whenever they offered a services, amount payable being negotiable. However 27.3% expressed their disappointment for having offered a service but no payment was realized from the community, this is shown in table 4.19.

Table 4.19: Remuneration of pump mechanics

Paid	Frequency	Percentage
Yes	8	72.7
No	3	27.3
Total	**11**	**100.0**

4.12.1 Constraints Experienced by Hand Pump Mechanics

The following were given as the major challenges faced by the area hand pump Mechanics;

Table 4.20: Shows major challenges affecting Pump Mechanics

No	Activity	% Respondent
1	Lack of Tool Box	82
2	Lack of Transport	100
3	Lack of funds by Community to buy Spare Part	45
4	Lack of easy access to Spare parts	91
5	Lack of facilitation	100
6	Drying up of Water Sources	27
7	Lack of Belongingness of Hand Pump Mechanics	55
8	Inadequate Training of Respondent	64
9	Ignorance of Communities of their roles	36

4.13 Summary of the Main Findings of the Study

From section 1.0, Community based Management Systems of rural Water facilities basically comprised of the Water Users (beneficiaries), Water User Committees, which undertake day to day management, area local council, Area Hand Pump Mechanics, Community Development Assistants and Health Assistants and finally Hand Pump Spare Parts Suppliers. If all the above parties played their parts effectively and efficiently, all water points that had been put in place within rural communities would be sustained. A summary of the findings from each of the above categories is given below.

4.13.1 Water Users (Beneficiaries)

In a proper functional CBMS, the major role of the beneficiaries is to contribute funds, materials and or labour both at implementation stage and towards operation and maintenance of their sources whenever called upon.

24.1% of the respondents made contribution at the construction phase of their water facilities. The 66.3% that did not contribute at all as observed in section 4.4, and reasons related to inadequate sensitization.

This implied that once the beneficiaries were fully sensitized following the right procedure as laid down by the Rural Water Operation and Maintenance manual, would all be willing to contribute towards construction of a water facility within their area, thus a sense of ownership.

On the other hand, 27% of the respondents made contributions towards O & M of their water facilities, while the 73%(Table 4.8) that did not contribute gave reasons related to inadequate sensitization plus failure of their political heads to follow the proper O & M policy for rural water facilities as clearly laid out in the Water Statute 1995 and National Water Policy 1999 (section 2.3.2 & 2.3.3), thus confusing the community of its roles.

Political heads that were expected to mobilize community towards contribution for O & M, instead constantly repair such sources in request for votes at the time of election, thus completely destroying the willingness of the community to contribute.

4.13.2 Water User Committee (WUC)

29.2% of the respondents were satisfied with the performance of the WUC, while all the WUC members interviewed showed knowledge of at least one of their roles.

The 67% that was not .satisfied gave reasons (Table 4.5), which were clearly justifiable by the fact that 78.55% of the WUC members have never been trained at all on their roles.

81.7% of the WUC members requested for a training in their individual roles such as simple book keeping for the case of treasurers. Once the trainings are done, all WUC members would be able to perform their perfectly.

50.2% of the respondents recommended remuneration for all WUC members, of which 85.8 % recommended remuneration in form of allowances from the district.

85.7% of all the water sources which had female care takers were functional as compared to 77.7% functional sources that were managed by male care takers.

4.13.3 Local Council One (LC1)

The major role of the LC1 leadership towards a CBMS is to assist WUC members to mobilize the user communities to contribute towards O & M of their water sources. However from the findings, some LC1 chairpersons were among the 73.0% respondents that never made any contribution towards O & M claiming of not being paid as LC members for their services by the government thus could not contribute. Intervention are frequently hostage to local political environments that both make community based management far harder to realize in practice, and more inherently conflict laden than is often assumed. 22.9% of the water source that were sampled had their cash collection kept by the area LC1 chairpersons instead of the treasurer of the committee. This was a clear view of conflict of interest between LC1 leaders and WUC members.

On one of such water sources, the chairperson of the WUC made an interesting remark ”as WUC members with the help of LC1, we set bye-laws to govern our water source, but one of the beneficiary breaks such laws, we do not have powers to discipline such a user, it remains the responsibility of the LC1 leadership to take action, which leadership can not take any action as it is scared of not being voted in office next time, in the end what do we do as a committee, he asked”. The researcher concluded that absence of a legal framework has greatly affected performance CBMS.

4.13.4 Hand Pump Mechanics

27.3% of the hand pump mechanics interviewed were doing their work whenever called upon by community and at the same time remunerated at agreed terms basing on the quantity of the work to be done.

72.7% had done work at one time and when the community failed to pay for their services, they withdrew from doing such work and opted for other odd jobs.

All the pump mechanics were experiencing a lot of challenges as summarized below, such problems needed immediate attention in order to improve on their service delivery.

Table 4.21: Shows Problem areas for Pump Mechanics that require attention

No	Activity	% Respondent
1	Lack of Tool Box	82
2	Lack of Transport	100
3	Lack of funds by Community to buy Spare Part	45
4	Lack of easy access to Spare parts	91
5	Lack of facilitation	100
6	Drying up of Water Sources	27
7	Lack of Belongingness of Hand Pump Mechanics	55
8	Inadequate Training of Respondent	64
9	Ignorance of Communities of their roles	36

4.13.5 Community Development Assistants and Health Assistants (CDA & HA)

The major role of these two categories of Government officials employed at sub-county level is to train the water user committee members on their roles plus assisting in community mobilization.

78.5% of the WUC had never been trained, this implied that much as CDA and HA were fully facilitated by the district water office, they were not fulfilling their role of training WUC. Of the 78.9% of the few training that were held, took place at the sub-county headquarters whereby a few individuals of the WUC were trained for only one day without any demonstration such that by the time they reached their respective water sources they could hardly remember any thing. Training should clearly follow the procedure mentioned in Section 2.5.

4.13.6 Hand Pump Spare Parts Suppliers

Table 4.9, it was quite clear that there were no spare parts suppliers for hand pumps within the whole of Rakai District. Whenever needed, either the community or the hand pump mechanic

once contacted had to travel all the way to Masaka Town to access some spares parts that were available, otherwise most spare parts had to be bought from Kampala, approximately 200km away.

Lack of hand pump spare parts supplier also meant that at times some crude hand pump mechanics/bicycle repairers could steal spares from one source and sell them to another community and this was the main the reason that caused the rampant theft of hand pump parts at that time by unknown individuals. The researcher was able to establish that some hand pump parts such as bolts and nuts were being removed and used by motor cycle/bicycle mechanics since they were compatible.

On contacting the spare parts shops in Masaka and Kampala, reasons such as there being no constant market for such spares within communities made it impossible for them to establish shops as this would mean tying down their resources.

With the above summary, all the five set objectives were adequately addressed.

The remaining task was to look into the hypothesis before any conclusion and recommendations could be made.

4.14 Descriptive Statistics

In order to answer the research questions at hand using the data obtained from the questionnaires, data analysis was done using both SPSS and Microsoft Excel.

The Table 4.19 shows a summary of the statistics obtained from SPSS.

Table 4.22: Shows Descriptive Statistics

Statistics	*Sex*	*Source of Income*	*Position in Society*	*Capital pay*	*Performance of WUC*	*Is WUC Paid*	*Need to Pay WUC*	*O & M Pay*	*Availability of spare parts*	*Time taken to obtain Spare Parts*
Mean	1.33	2.53	6.80	0.30	0.25	0.28	0.48	0.21	2.64	1.91
Standard Error	0.03	0.11	0.30	0.03	0.03	0.03	0.03	0.03	0.11	0.09
Median	1	1	7	0	0	0	1	0	2	1
Mode	1	1	1	0	0	0	1	0	1	1
Standard Deviation	0.47	1.86	4.96	0.49	0.52	0.47	0.55	0.50	1.77	1.50
Sample Variance	0.22	3.45	24.57	0.24	0.27	0.23	0.30	0.25	3.12	2.25
Kurtosis	-1.48	-1.30	-1.37	-0.81	-0.33	-0.75	-0.95	0.08	-1.49	1.04
Skewness	0.73	0.61	0.23	0.51	0.27	0.66	-0.38	0.32	0.47	1.51
Range	1	6	15	2	2	2	2	2	5	5
Minimum	1	1	1	-1	-1	-1	-1	-1	1	1
Maximum	2	7	16	1	1	1	1	1	6	6
Sum	355	676	1815	79	68	75	127	55	704	511
Count	267	267	267	267	267	267	267	267	267	267

Table 4.23: Shows Cross tabulation

			Performance of WUC			Total
			-1	0	1	
O & M Contribution	-1	Count	0	8	4	12
		Expected Count	.4	8.0	3.5	12.0
	0	Count	10	129	49	188
		Expected Count	7.0	126.0	54.9	188.0
	1	Count	0	42	25	67
		Expected Count	2.5	44.9	19.6	67.0
Total		Count	10	179	78	267
		Expected Count	10.0	179.0	78.0	267.0

Table 4.24: Shows Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.674[a]	4	.154
Likelihood Ratio	9.391	4	.052
Linear-by-Linear Association	2.719	1	.099
N of Valid Cases	267		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .45.

From the Chi-Square tests above, Pearson Chi-Square value is 6.674. The probability is 0.154, and the degrees of freedom are 4. But from tables, Pearson Chi-Square value is 9.48 and the probability is 0.05. Therefore since 0.154 > 0.05, and 6.674 < 9.48 then it can be concluded that there is no relationship between contribution towards O & M with the performance of Water User Committees.

This probably suggests that people are more willing to participate by contributing say in terms of providing manual labour during the inception stage of the water point being provided.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter presents conclusions drawn by the researcher upon which some recommendations on what should be done to improve sustainability of rural water facilities are based. It finally identifies area of further research and for policy measures in Uganda.

It is imperative however, to reflect on both the objectives of the study and the hypothesis before the researcher zero down on conclusion. As stated in Sections 1.4 and 1.5 above, the study had four objectives;

- Establish the number of CBMS in relation to existing rural water facilities.
- Establish the relationship between CBMS and improved sustainability/functionality of water sources.
- Establish the relationship between functionality and existing technological options.
- Establish the relationship between capital contribution and functionality

On top of the above objectives, the study was based of testing for the following hypothesis;

H_o; Community Based Management Systems could not guarantee 100% Functionality rate of Constructed Safe Rural Water Sources.

The alternative hypothesis, against which the null hypothesis was tested, was;

H_a; Community Based Maintenance Systems could guarantee 100% Functionality rate of Constructed Safe Rural Water Sources.

It is in this chapter that the researcher will indicate how the set objectives had been achieved and how the hypothesis was tested.

5.1 Conclusion

Cross tabulation was carried out for each of the specific objective apart from objective one as explained below. It should be remembered as per the introduction that CBMS basically involve Water User Committees (WUC), Pump Mechanics, Care takers, Water and Sanitation Committees and Spare Parts Distributors. Since the biggest role of CBMS is entrusted to WUC, which are the fulltime trustees of water facilities, the researcher based on the findings from the WUC to look into specific objectives one and two.

5.2 Establish the number of CBMS in relation to existing rural water facilities.

This particular objective did not require cross tabulation, the table below clearly shows the number of water sources with CBMS-WUC.

Table 5.1: Number of Water Points with WUC

Sources Having WUC	**Sources**
WUC Available	40
No WUC	8
Total	**48**

It was concluded that much as the Rural Water and Sanitation Operational Plan (Section 2.5.6) emphasises formation of WUC for every source even before a performance of CBMA negatively as this component was lacking.

5.3 Relationship between CBMS and improved sustainability of water sources.

As per the explanation given above, WUC was used as a basis for carrying out this examination. Below is the output from SPSS showing the cross tabulation between availability of Water User Committee and functionality where;

- Availability of Water User Committee:
  - 1 = Water User Committee present
  - 0 = No Water User Committee

- Functionality of source:
  - 1 = Functional
  - 0 = Not functional

Table 5.2: Availability of WUC Functionality of Source Cross tabulation

			Functionality of Source		
			0	1	Total
Availability of WUC	0	Count	5	3	8
		Expected Count	2.8	5.2	8.0
	1	Count	12	28	40
		Expected Count	14.2	25.8	40.0
Total		Count	17	31	48
		Expected Count	17.0	31.0	48.0

Table 5.3: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.079[b]	1	.079		
Continuity Correction[a]	1.822	1	.177		
Likelihood Ratio	2.945	1	.086		
Fisher's Exact Test				.112	.091
Linear-by-Linear Association	3.014	1	.083		
N of Valid Cases	48				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.83.

From the Chi-Square tests above, Pearson Chi-Square value is 3.079. The probability is 0.079, and the degree of freedom is 1. But from tables, Pearson Chi-Square value is 3.84 and the probability is 0.05.

It was concluded that since 0.079 > 0.05, and 3.079 < 3.84 then there was no relationship between the presence of Water User Committees and functionality of point water sources, some sources without WUCs were functional.

5.4 Establish the relationship between functionality and existing technological options.
Below is the output from SPSS showing the cross tabulation between functionality and technological options available.

Type of water source:

- 1 = Boreholes
- 2 = Shallow wells
- 3 = Protected Springs
- 4 = Valley Tank

- Functionality of source:
  - 1 = Functional
  - 0 = Not functional

Table 5.4: Type of Water Source Functionality of Source Cross tab

			Functionality of Source		
			0	1	Total
Type of Water Source	1	Count	11	14	25
		Expected Count	8.9	16.1	25.0
	2	Count	5	14	19
		Expected Count	6.7	12.3	19.0
	3	Count	0	3	3
		Expected Count	1.1	1.9	3.0
	4	Count	1	0	1
		Expected Count	.4	.6	1.0
Total		Count	17	31	48
		Expected Count	17.0	31.0	48.0

Table 5.5 Chi-Square Tests

	Value	df	Asymp. Sig.
Pearson Chi-Square	8.962[a]	3	.045
Likelihood Ratio	6.202	3	.102
Linear-by-Linear Association	.664	1	.415
N of Valid Cases	48		

a. 4 cells (50.0%) have expected count less than 5. The Minimum expected count is .35.

From the Chi-Square tests above, Pearson Chi-Square value is 8.962. The probability is 0.045, and the degrees of freedom are 3. But from tables, Pearson Chi-Square value is 7.81 and the probability is 0.05.

It was concluded that since 0.045 < 0.05, and 8.962 > 7.81 then there was a relationship between the type of water source and its functionality. The technological option selected has a direct relationship with the functionality of the water source constructed.

5.5 Establish the relationship between capital Contribution and functionality

Below is the output from SPSS showing the cross tabulation between capital contribution and functionality of water sources;

Table 5.6: Type of Contribution Made Is the Source Functional Cross tabulation

		Is the Source Functional			Total
		Yes	No	Not Sure	
Type of Contribution Made	Manual Labor	29	7	1	37
	Provided Food	20	4	1	25
	Contributed Money	14	14	0	28
	Provided Local Material	4	1	0	5
Total		67	26	2	95

Table 5.7: 5 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.047(a)	6	.037
Likelihood Ratio	11.108	6	.035
Linear-by-Linear Association	2.015	1	.156
No. of Valid Cases	95		

6 cells (50.0%) have expected count less than 5. The minimum expected count is .11.

From the Chi-Square tests above, Pearson Chi-Square value is 11.047. The probability is 0.037, and the degrees of freedom are 6. But from tables, Pearson Chi-Square value is 9.48 and the probability is 0.05.

It was concluded that since 0.037 < 0.05, and 11.047 > 9.48 then there was a relationship between capital contribution at the time of contribution of the project and its functionality during operation.

5.6 Testing the hypothesis

As clearly states in Section 1.5, the hypothesis were as stated below and as earlier stated (section 3.5) were to be tested at a significance level of 5% ($\alpha = 0.05$);

H_o; Community Based Management Systems could not guarantee 100% Functionality rate of Constructed Safe Rural Water Sources.

The alternative hypothesis, against which the null hypothesis was tested, was;

H_a; Community Based Maintenance Systems could guarantee 100% Functionality rate of Constructed Safe Rural Water Sources.

From the SPSS output, frequency analyses, and descriptive statistics it can be concluded that Community Based Management Systems cannot guarantee 100% functionality rate of Constructed Safe Rural Water Sources. (As indicated by the results obtained) thus the null hypothesis is retained.

Though CBMS has worked well in some areas like water user committees, sustainability of rural water facilities still remains a problem in a number of aspects like inadequate sensitisation, contribution towards O & M plus unavailability of spare parts.
This can be attributed to a number of issues;

i. **Behavior change;** This is a slow process that requires experts to be more involved so that people realize their roles in society and as useful citizens. Take an example of research question 6, SPSS output shows that most of the respondents promised to pay when they were asked whether WUCs should be remunerated, but when it came to the actual paying, most of them did not pay. This means that either they did not have the money or they were not convinced that it was necessary to pay the money. This is one of the reasons that functionality is independent of the water source type as seen from the SPSS output. People seem not to be bothered!

ii. **Poverty**; from the descriptive statistics seen earlier, it was indicated that the mode source of income was peasant farmers. This means that such people rely on farming to earn a living where they plant and harvest for food security and sell the little surplus to get an income, which is seasonal. Water sources don't break seasonally! They can break anytime and depending on whether the farmer had a surplus for sell, then they will be in position to contribute. Therefore this can greatly undermine the requirement of paying a timely (say monthly) fee to the WUC.

iii. **Timely action**; from the descriptive statistics, it was shown that the of spare parts was one week. However from the coded data, the time varied from between one week to three months. When small parts break and it takes long to replace them, these broken parts most times cause other parts to wear out quickly and hence causing more damage! Therefore something which starts small eventually grows big and soon out of proportion for the community to handle.

5.7 Recommendations

As a result of this study, basing on the results obtained, to ensure 100% functionality of rural safe water points, water user committees, Pump mechanics, Community, Government both local and central, which are components of CBMS require improvement. Recommendations are given for each of the above components.

i) Water User Committee (WUC)

- Training of WUC must be on job, at the actual site and should take at least two days.

- Follow up trainings must be organized of all previously trained WUC to review progress
- At training stage, during the selection of a care taker by all members of WUC, emphasis should be put at having a woman for this post as this research has shown that they are more committed, and all care takers must be provided with tools to enable the carry out minor repairs of the hand pump as per their training.

ii) Hand Pump Mechanics

- Pump mechanics within Rakai District should be advised to form an association which should be helped by the district to get all works to do with repair or rehabilitation of all water facilities within the district, this will enable them earn a living as there is a lot of rehabilitation work of water facilities that is done by other tenderers being paid highly by the District.
- Pump mechanics together with the District should agree on a fee that is affordable by the community, which on average should be paid by the community to the pump mechanics, whenever repair of a water facility is done. On top of this, pump mechanics should always sign an agreement with the community before repair of a water source is done.
- Whenever a district carries out training of hand pump mechanics, it must provide them with tools at least on a loan basis, as a present most pump mechanics who where trained were not availed with any tool thus they can not do any repair, thus wasted resources for training.
- It is strongly recommended that while selecting hand Pump Mechanics to be trained, emphasis should be given to women since they are the most involved in water collection and will very much be appreciative of the little allowance offered during repair by the community rather than men who demand a lot of allowance. (Section 2.7 and 2.8 concerning experiment done in India and Zimbabwe by UNICEF)

iii) Community (Water Users)

- Demand Responsive Approach (DRA), must be adopted so that people themselves take the initiative and responsibility for improving their water supply situation rather than being passing recipients of government services.

- No new installations or schemes shall be considered without prior establishment of ownership of the facility and establishment or strengthening the system for operation and maintenance, including sufficient proof that the users are willing and can afford to meet the recurrent costs.
- As soon as communities submit their application for a water facility and an agreement is reached to construct such facility, Community Development Assistants and Healthy Assistants with the help of the district water office should ensure that such communities are fully mobilized on whatever is expected of them plus WUC formed three months before the actual construction process.
- During the implementation process, the benefiting community must be fully involved in the whole process.
- On completion of the facility, it must be handed over to the expected users .

iv) Government (Central Government, District, Sub-County and LC1)

- There is need to provide legality to the CBMS as it was noted there is no legal framework except for the National Water Policy.
- To ensure sustainability of water sources, communities managing their water sources must be given support from different angles. It is not appropriate to leave communities by their own after completion of a new water source. Institutional support mechanisms, policies, legislation, proper monitoring and continued capacity building must be undertaken to ensure functionality of CBMS towards maintenance of rural water sources
- The district should recognize the services offered by the WUC and reward them with a certificate of appreciation on a yearly basis, and the Chief Administrative Officer should on top of the certificate communicate to the parish chiefs excusing WUC members from any other communal works within a parish, leaving them to concentrate of water sources.
- LC1 Chairpersons should totally stop keeping collected funds by the WUC, the treasurer of the WUC should be left to do their role, and such treasurer should be women because of the observed management.

- The District with the help of the central government should ensure that borehole/shallow well spare parts are available at least within every sub-county, from were the community can access such spares easily. This can easily be done if a district sets up a condition that for all new water points to be done within a sub-county, installation parts must be bought within such a sub-county, since this will be an assured way of getting market for hand pump parts, dealers will be forced to set up shops or agencies at sub-county level (or county level)

5.8 Recommendations for Further Research

The following areas for further research are recommended

- Feasibility of recruiting pump mechanics on the government pays role to reduce the burden of communities having to pay for their services.
- Paying Allowances to Water User Committee members

Bibliography

1. Norathius Asingwire, Dennis Muhangi and John Odolon, 2005, Factors influencing equitable distribution of water supply and sanitation services in Uganda, Kampala, Uganda

2. Centre for Basic Research, 2005, The impact of Political corruption on resource allocation and service delivery in local governments in Uganda; Kampala; Uganda.

3. Ministry of Water, Lands and Environment, 2003, Water and Sanitation in Uganda, Measuring performance; Kampala, Uganda.

4 Atnafe Beyene, 2005, Scaling up management of Water Supply and Sanitation services: Ethiopian Experience; Addis Ababa; Ethiopia.

5. I.V.W. Ediriweera, 2005, Strategies adopted for sustained water supply and sanitation through community participation in Sri Lanka, Sri Lanka; 31st WEDC International Conference, Kampala, Uganda 2005.

6. Ministry of Housing and Plantation Infrastructure (2001) National Policy for Rural Water and sanitation sector; Sri Lanka

7. World Bank (2003), Project Director (Technical), 2nd community water supply and sanitation project, 9th Floor, Sethsiripaya, Battaramula, Sri Lanka

8. Alan M, 1997, The Spirit and Power of Water- the Humanising of Rural Water Supply in Africa, Viewed 6 January 2004, <http://www.fondation-langlois.org/>.

9. Alan N, 2003, Decentralization and Community Management in Sangwe Community Area, Zimbabwe, Viewed 26 January 2004, <http://www.ids.ac.uk/slsa>.

10. Bailey, R.A, 1996, Water and Environment Management in Developing Countries, CIWEM, London.

11. Frank H, & Ronald M, 2001, Modern construction management, Blackwell science ltd, 9600 garsington road, Oxford ox42dq, UKICE, 2003, Engineering Journal on Sustainability, London: England.

12. John, M & Will, H 1992, Construction contracts law and management, E & FN Spon, Chapman & Hall, 2-6 Boundary row, London SE1 8HN, UK.

13. Mazumdar. K, Gender and Social Issues in Rural Water Supply and Sanitation Programme, Rajiv Gandhi National Drinking Water Mission, Ministry of rural development government of India.

14. Micheal, W, 1997, Partnership Changes in Rural Water Supply; WEDC Conference. Durban, South Africa

15. Directorate of Water Development 2004, A National Framework for Operation and Maintenance of Rural Water Supplies, Rural Water Supply Division DWD, Kampala, Uganda

16. Ministry of Finance, Planning and economic Development, 2002, Uganda Participatory Poverty Assessment Process, Kampala, Uganda.

17. Ministry of Water Lands and Environment (DWD), 2002, Rural Water and Sanitation Strategic Investment Plan, Kampala, Uganda.

18. Rugumayo .A, Rural Water and Sanitation Lecture Notes, Ministry of Energy/Lecturer Makerere University Kampala, Uganda

19 Ministry of Water Lands and Environment (DWD), 2002, Rural Water and Sanitation Strategic Investment Plan, Kampala, Uganda.

20. O'Flaherty, C, A 2002, Highways the location design construction & maintenance of pavements, Butterworth-Heinemann, Linacre house, Jordan hill, Oxford OX2 8DP.

21. Rural Water Supply and Sanitation, Handbook for extension workers, Community management, Ministry of Gender, Labour and Social Development, Vol.1.

22 Sharman H, 2000, Sustainability of Rural Water facilities, Institute of Social and Economic Research, University of Alaska Anchorage.

23. The Local Governments Act, 1997, Decentralisation in Uganda popular version, Uppc, Entebbe.

24. Yoweri K, M, 2001, Consolidating the Achievements of the Movement**,** Election Manifesto, Kampala, Uganda.

25 Issue Paper No 3, Framework for Sector-Wide Approach to Planning Water Supply and Sanitation Sector. Joint GOU/Donor Review of the Water and Sanitation Sector 2001, Directorate of Water Development. Ministry of Water, Lands and Environment, Uganda.

26 Issue Paper No 5, Strategy for Rural Water Supply Investment including Operations and Maintenance, Joint GOU/Donor Review of the Water and Sanitation Sector 2001. Directorate of Water Development, Ministry of Water, Lands and Environment, Uganda.

27 NURP Implementation Manual, Directorate of Water Development, Ministry of Natural Resources,1993, Kampala, Uganda.

28 Asingwire,P., Muhangi, A., and Odolon,J., 'Factors Influencing Equitable Distribution of Water Supply and Sanitation Services In Uganda', 31st WEDC International Conference , Kampala, Uganda, Loughborough University, 2006, UK.

29 Kiconco.G.,Bagamahunda,G., 'Communities take on Operation and Maintenance Responsibilities The Case of Kigezi Diocese, 31st WEDC International Conference , Kampala, Uganda, Loughborough University, 2006, UK.

30 Rugumayo, A.I.,The NURP Water and Sanitation Project, Proceedings of the 23rd WEDC International Conference Durban, South Africa, Loughborough University,1998, UK.

31 Study of the Operation and Maintenance of Rural Water Facilities in Uganda, Directorate of Water Development, Ministry of Water, Lands and Environment, 2001 Kampala, Uganda.

32 NGO Performance Report for 2007, UWASNET, 2008, Kampala, Uganda.

33 Mulders, C., Sloots R. The Overburden Aquifer and its Potential to reaching the MDG Targets for Safe Water, Proceedings Groundwater and Climate in Africa, 2008, Kampala, Uganda, Ministry of Water and Environment, University College, London., UK.

34 Niwagaba, C., Human Excreta Treatment Technologies – Prerequisites, Constraints and Performance, Licentiate Thesis, Department of Biometry and Engineering, Swedish University of Agricultural Sciences, 2007, Uppsala, Sweden.

35 Rugumayo, A.I., Rainwater Harvesting in Uganda Proceedings of the 21st WEDC International Conference, Kampala, Uganda, Loughborough University,1995, UK.

36 Cochran, W. G. 1963. *Sampling Techniques*, 2nd Ed., New York: John Wiley and Sons, Inc.

37 Israel, Glenn D. 1992. *Sampling The Evidence Of Extension Program Impact*. Sons, Inc. Development, IFAS, University of Florida. PEOD-5. October.

38 Kish, Leslie. 1965. Survey Sampling. New York: John Wiley and Sons, Inc.

39 Miaoulis, George, and R. D. Michener. 1976. An Introduction to Sampling. Dubuque, Iowa: Kendall/Hunt Publishing Company.

40 Smith, M. F. 1983. Sampling Considerations In Evaluating Cooperative Extension Programs. Florida Cooperative Extension Service Bulletin PE-1. Institute of Food and Agricultural Sciences. University of Florida.

41 Sudman, Seymour. 1976. Applied Sampling. New York: Academic Press. Yamane, Taro. 1967. Statistics, An Introductory Analysis, 2nd Ed., New York: Harper and Row.

42 IRC, 2003, Scaling up Community management in Ganjam, Orissa- India, <http://www2.irc.nl/manage/debate/ganjam.htnl

43 Amsalu Negussie, 2003 IRC, Institutionalising Community Management in Uganda, WaterAid Uganda

APPENDIX A

APPENDIX A: QUESTIONNAIRE

This research Entitled," **AN ASSESSMENT OF THE PERFORMANCE OF COMMUNITY BASED MANAGEMENT SYSTEMS (CBMS) IN MAINTENANCE OF RURAL WATER FACILITIES IN RAKAI DISTRICT" is intended to establish reasons why CBMS considered by government as the best method of carrying out sustainability of Water facilities has not performed well, as quite a number of broken down water facilities keep on increasing every day, with hardly any repair being done. Community Based Maintenance Systems basically involves *Water and Sanitation Committees (WSC) Water User Committees (WUCs) Pump Mechanics, Care Takers, Water User Association*, which are basically involved in operation and maintenance (O & M) of rural water facilities.**

You are kindly requested to avail the information asked below to enable improvement of sustainability of our water sources. THANKS.

1. Location of the water source (Name, Village, Sub-county, County) ----------
   ---
2. Type of Water Source (Shallow well, Borehole, Protected spring, Valley Tank, communal Tank, Other-Specify)----------
3. Name of Respondent---------- (Optional)
4. Position in Society----------
5. Name of firm/Organization/Community----------
   ---
6. Age Group (10-17, 18-35, 36-50, above 50yrs)----------
7. Male or Female----------
8. Source of Income----------

Community (LC1 Council; Water User Community)

9. What is your source of water for domestic use?----------

10. Is it protected? Yes/No----------

11. **If YES**, who protected it?----------

12. Is it functional? Yes/No----------

13. Did you make any contributions towards the protection? Yes/No----------

14. **If YES**, what type of contributions did you make?

---

15. Why **DID YOU OR DID YOU NOT** contribute?----------

---

16. Which other protected source of water do you know?.---------- ----------

---

17. How is your water source maintained?----------

18. Does your water source have a W UC? YES / NO / I DONOT KNOW----------

---

19. **IF YES**, How many members are in the committee?

    Men----------

    Women----------

20. Who are the members holding the positions below? MALE/ FEMALE

    Chairperson of WUC----------

    Treasurer of WUC----------

    Secretary of WUC----------

21. What are the roles of the WUC?----------

---

22. Is the Care taker a **MALE or FEMALE**----------

23. How would you rate the performance of the WUC members? (**Satisfactory/not satisfactory**)----------

    Give reasons----------

---

24. Are the members of your WUC remunerated? Yes/No----------

25. **IF YES**, How?----------

26. **IF NO**, Should the WUC be remunerated? Yes/no----------

27. **IF YES**, How?----------

28. Have you ever contributed money towards maintenance of your water source? Yes/No----------

29. **IF YES,** how much money did you contribute?----------

30. **IF NO**, Why not?----------

31. How often is this contribution made?----------

32. Are you satisfied with the way the contribution is done?----------

---

33. How is the money kept?----------

---

34. Who repairs your source in case it breaks down?----------

---

35. Who pays for the repairs?----------

---

36. What would you consider as the major problems of maintenance of your source?----------

---

WATER USER COMMITTEE (WUC)

37. How did you become a member of this WUC?----------

---

38. What post do you hold in this committee?----------

---

39. What are your roles and responsibilities?----------

40. Have you ever had any training since you became a WUC member? Yes/No----------

41. **IF YES**, who carried out the training?----------

42. Where was the training held?----------

43. How long was the training?----------

44. How has the training benefited you?----------

45 Do you think you need any additional training in your role? Yes/No----------

46. **IF YES**, in which areas?----------

47. What kind of support if any do you get in carrying out your activities and from where?----

---

---

48. Who repairs your source in case it breaks down?----------

---

---

49. Who pays for the repairs?----------

---

50. On average how much is paid per repair?----------

---

51. Where do you get the spares for your source in case it requires some?

---

52. What is the average time taken to obtain identified spare parts for repairing your water source?----------

53. How many outstanding repairs have you failed to handle?----------

---

54. Give Reasons----------

---

55. When You failed to repair, who repaired your source?----------

---

---

56. How did you address the factors given in 54 above?----------

---

---

57. How long do you think the WUC members should serve?----------

---

58. If any member drops out, how do you replace them?----------

---

59. How often does WUC carryout preventive maintenance?----------

60. Who does it?----------

-

61 Does your MUC pay for carrying out the maintenance?----------

---

62 Does the WUC collect any money for repairs? Yes / No----------

63 **IF YES**, How much?----------

---

64 How Often?----------

65 How does the WUC kept the money?----------

---

66 How does the WUC keep its records on income and expenditure?----------

---

---

67 Does the WUC give any feed back to the community on how much is collected/spent?---------

---

---

68 For how long has the WUC been in place?----------

HUND PUMP MECHANICS (HPM)

69 What is you educational level?----------

70 When did you become a HPM?----------

71. How did you become a HPM?----------

72. What are your duties and responsibilities?----------

---

73. Have you ever had any training as HPM?----------

74. **IF YES**, who carried out the training?----------

75. How long was the training?----------

76. How has the training enhanced your performance as a HPM?----------

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77. Are you paid for your services? Yes/No----------

78. **IF YES**, By who and How much?----------

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79. How are you supervised in carrying out your duties?----------

---

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80. Where do you get the spare parts?----------

---

81. What types of support if any do you get in carrying out your activities?----------

---

---

82. What are the major challenges in carrying out your duties?----------

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83. Any suggestions for improvements?----------

APPENDIX B

APPENDIX B: SPSS DATA INTERPRETATION

The following is the meaning of each variable that was used both on the questionnaires and in analysis;

- Sex refers to the sex of the respondent.
    - 0 = Male
    - 1 = Female
- Source of income refers to the source of money.
    - 1 = Peasant Farmer
    - 2 = Carpenter
    - 3 = Livestock rearing
    - 4 = Petty trade
    - 5 = Motor cycle / Bicycle repairer
    - 6 = Salary earner paid by Government
    - 7 = Radio repairer
    - 8 = Salon
    - 9 = Bodaboda Man
    - 10 = Unemployed (house wife)
- Position in society refers to the role played by the respondent in society.
    - 1 = Chairperson LC1
    - 2 = Defence LC1
    - 3 = Information LC1
    - 4 = Women Affairs LC1
    - 5 = Treasurer LC1
    - 6 = Secretary LC1
    - 7 = Mobiliser LC1

- 8 = Water consumer
- 9 = Chairperson WUC
- 10 = Treasurer WUC
- 11 = Care taker WUC
- 12 = Advisor WUC
- 13 = Secretary WUC
- 14 = Mobiliser WUC
- 15 = Member WUC
- 16 = Pump mechanic

- Capital pay refers to whether the respondent contributes towards the construction of the facility.
  - 0 = Does not contribute
  - 1 = Contributes
  - -1 = Does not know
- Performance of WUC refers to the functionality of the Water User Committee.
  - 0 = Not satisfied
  - 1 = Satisfied
  - -1 = Does not know
- Is WUC paid refers to whether the respondent contributes towards the remuneration of the WUC.
  - 0 = Not remunerated
  - 1 = Remunerated
  - -1 =Don't Know
- Need to pay WUC refer to the willingness of the respondent to pay the WUC.
  - 0 = Not willing
  - 1 = willing

- -1 = don’t know

- O & M pay refers to whether the respondent contributes towards the maintenance of the facility.
    - 0 = Does not contribute
    - 1 = Contributes
    - -1 = Does not know
- Availability of spare parts refers to the proximity of spare parts.
    - 1 = from local pump mechanics
    - 2 = from district
    - 3 = from sub county
    - 4 = from shop in Masaka
    - 5 = from bicycle mechanics
    - 6 = don’t know
- Time taken to obtain spare parts refers to the duration.
    - 1 = one week
    - 2 = two weeks
    - 3 = one month
    - 4 = two months
    - 5 = three months
    - = more than three months

4 Does contribution on O&M affect the performance of WUC?

Below is the output from SPSS showing the cross tabulation between the capital contribution and performance of the WUC where;

- Performance of Water User Committee:
    - 1 = Satisfactory
    - 0 = Not satisfactory

    - -1 = don’t know whether it is satisfactory or not.
- O & M contribution:
    - 1 = Yes
    - 0 = No
    - -1 = Don’t know